

# **Energy Use and Emissions Inventory for Local Government Operations: 2013 Addendum**



**Produced by the City of Bloomington  
Department of Economic & Sustainable Development, December 2014**

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# Introduction

This addendum is intended to track City Government progress towards stated recommendations from the 2010 Local Government Operations Energy Use and Emissions Inventory. Particularly, this report will analyze the progress the City has made on tracking energy use, prioritizing energy efficiency opportunities and reducing City greenhouse gas emissions. To that end, comparisons to 2010 data and figures will be used to illustrate changes over the analysis period.

For continuity between the original report and this addendum, all energy and emission units will remain the same. In light of recent adjustments to the 2010 City of Bloomington Utilities (CBU) data, however, all 2010 City emissions have been calculated using updated coefficients. Additionally, since the “Mobile Source Refrigerants” and “Other Process Fugitive Emissions” represented less than 0.2% of total 2010 emissions, these sources have been omitted from this Addendum’s analysis. Table 1 below lists the Government Sectors which will be referenced throughout the report.

**Table 1: Government Sectors**

Buildings and Facilities
Streetlights and Traffic Signals
Water Delivery Facilities
Wastewater Facilities
Vehicle Fleet
Transit Fleet

# Executive Summary

In 2013 the City of Bloomington consumed approximately 220,000 million BTUs (MMBTUs) of electricity, natural gas and vehicle fuels collectively, spending over \$5.3 million for that energy. Emissions from this energy consumption resulted in over 36,000 tons of carbon dioxide equivalent (CO<sub>2</sub>e) being emitted. On a per-employee basis, these emissions equate to approximately 45 tons of CO<sub>2</sub>e per City of Bloomington employee.

In comparison to 2010 data, the above results represent savings in energy use, emissions and avoided cost of energy. City government operations experienced a 9.7 billion BTU (BBTUs) reduction in total energy consumption, equivalent to 2.9 million kWh or four percent of total consumption. As a result, City CO<sub>2</sub>e emissions fell by over 2,000 tons (6%). In contrast, utility rates for energy rose from 2010 to 2013, causing City energy expenses to rise by approximately \$660,000 (14%). Reductions in energy consumption, however, are calculated to have avoided over \$200,000 in energy expenses in 2013 alone. That is, if the City had continued to consume energy at the same rate as in 2010, the total energy bill would have been \$200,000 higher.

The updated Energy Use & Emissions Inventory illustrates that over the 2010-2013 analysis period City buildings and facilities experienced the largest reduction in energy consumption and CO<sub>2</sub>e emissions. In 2013, City buildings and facilities consumed approximately 5,600 MMBTUs (13%) less than in 2010 and reduced annual CO<sub>2</sub>e emissions by roughly 1,500 tons (20%). CBU's water delivery branch of service experienced the second highest reduction in total City Government energy use and CO<sub>2</sub>e emissions. In 2013, Water Delivery services consumed roughly 4,300 MMBTUs (8%) less energy and reduced CO<sub>2</sub>e emissions by roughly 850 tons (7%).

Some City government sectors, however, experienced increases in energy consumption. For instance, CBU's wastewater branch of service and the Bloomington Transit fleet both experienced increases in energy consumed (5% and 1% respectively). Given the increasing price of energy of the analysis period, these two City Government Sectors also experienced the highest percent change in total energy expenditures, each experiencing a 34% increase in total energy expenditures.

Given this data, it becomes clear that the City's efforts to conserve energy and increase energy efficiency across City government operations is indeed reducing aggregate City energy consumption, CO<sub>2</sub>e emissions and avoiding energy expenditures which would occur in the absence of such efforts. The 2010 Inventory prescribed four short-term recommendations for the City to undertake to improve upon that Inventory's findings. Though the aggregate energy, avoided cost and emissions reductions achieved over the analysis period are not double-digit reductions, the City has certainly made tangible progress on all prescribed recommendations and improved City energy performance.

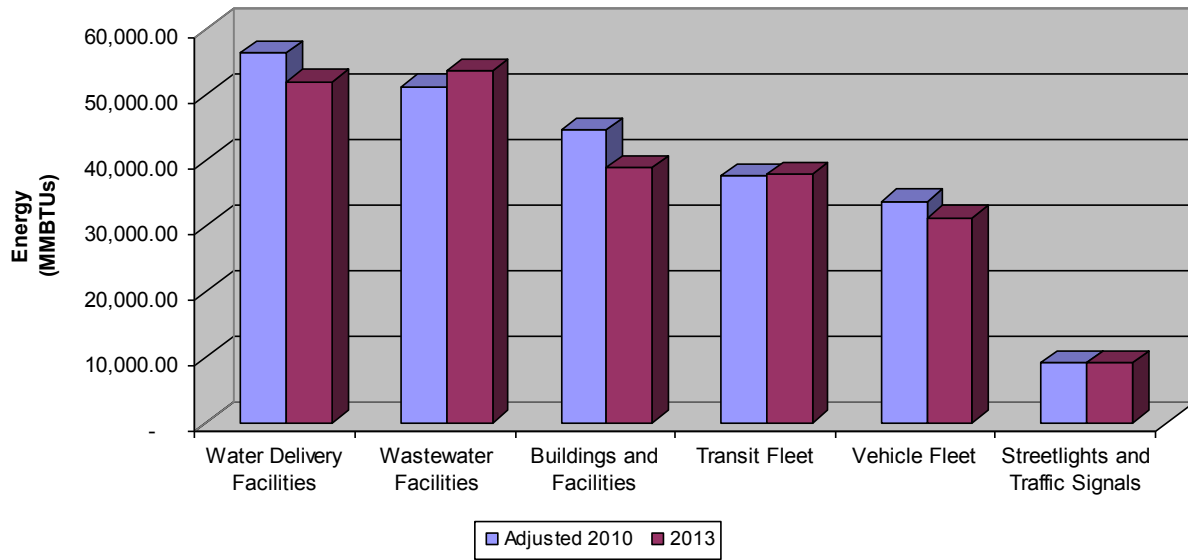
# Government Operations Energy Use and Emissions Inventory Addendum Results

## Local Government Energy Consumption, Costs, and Emissions by Sector

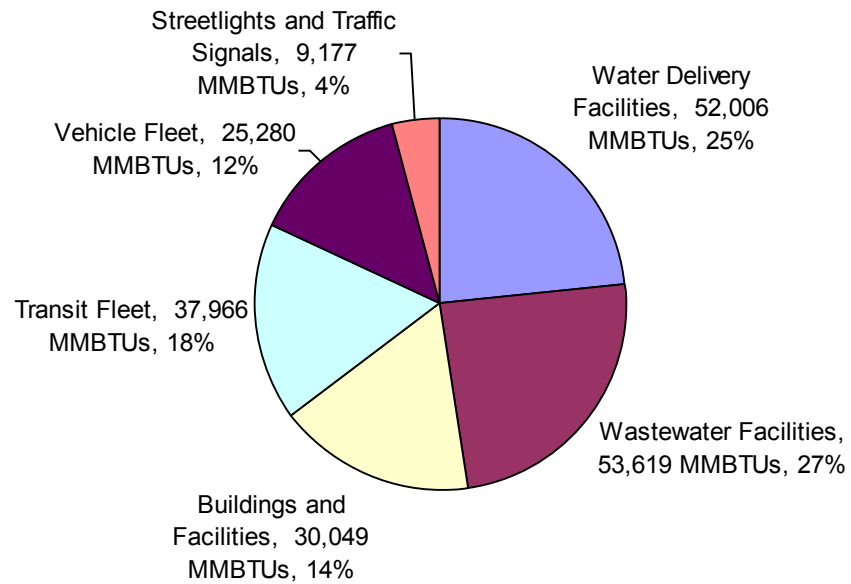
The City's water delivery and wastewater facilities continue to be the largest source of energy consumption in City operations, though wastewater has now replaced water delivery as the City's largest energy consumer and emissions source. These two City operations collectively account for 47% of total energy consumption, 46% of energy expenditures and 61% of total CO<sub>2</sub>e emissions. The City's vehicle fuel usage (including both non-transit and transit vehicles) remains the second largest consumer of energy, accounting for 31% of total energy consumption, 33% of total energy expenditures and 17% of emissions. City buildings and facilities have fallen from 19% of total energy consumption to 17.5%. Likewise, energy expenditures associated with City buildings and facilities have fallen from 17% of total energy expenditures to 15% and emissions from this energy consumption have fallen from 20% of total emissions to 17%. Finally, streetlights and traffic signals remained virtually unchanged with energy usage continuing to comprise 4% of total City energy consumption. Expenditures for this energy, however, have fallen from 9% to 8% of total energy expenses and emissions have risen from 5% to 6% of total City CO<sub>2</sub>e emissions (most likely due to the fact that these accounts are largely un-metered and remained constant in light of other reductions). Table 2 and Figures 1 through 6 illustrate these changes.

<b>Table 2: City Government Energy Consumption, Cost and Emissions by Government Sector</b>						
<b>Sector</b>	<b>CO<sub>2</sub>e (tons)</b>	<b>CO<sub>2</sub>e (%)</b>	<b>Energy Use (MMBTUs)</b>	<b>Energy Use (%)</b>	<b>Cost (\$)</b>	<b>Cost (%)</b>
<b>Adjusted 2010</b>						
Water Delivery Facilities	12,128.95	31.65%	56,363	24.22%	\$1,099,092.24	23.56%
Wastewater Facilities	10,340.49	26.99%	51,259	22.03%	\$ 866,123.18	18.56%
Buildings and Facilities	7,636.22	19.93%	44,547	19.15%	\$ 795,387.86	17.05%
Vehicle Fleet	2,893.18	7.55%	33,737	14.50%	\$ 781,146.00	16.74%
Transit Fleet	3,285.94	8.58%	37,584	16.15%	\$ 685,300.00	14.69%
Streetlights and Traffic Signals	2,033.44	5.31%	9,182	3.95%	\$ 438,456.00	9.40%
<b>Total</b>	<b>38,318.22</b>	<b>100%</b>	<b>232,672</b>	<b>100%</b>	<b>\$4,665,505.28</b>	<b>100%</b>
<b>2013</b>						
Wastewater Facilities	10,758.45	29.74%	53,618.89	24.05%	\$1,164,217.40	21.84%
Water Delivery Facilities	11,267.63	31.14%	52,006.28	23.33%	\$1,185,745.20	22.24%
Buildings and Facilities	6,123.82	16.93%	38,937.49	17.47%	\$ 777,173.06	14.58%
Transit Fleet	3,317.11	9.17%	37,965.74	17.03%	\$ 919,066.59	17.24%
Vehicle Fleet	2,681.05	7.41%	31,236.97	14.01%	\$ 852,720.09	16.00%
Streetlights and Traffic Signals	2,032.31	5.62%	9,176.91	4.12%	\$ 432,121.47	8.11%
<b>Total</b>	<b>36,180.37</b>	<b>100%</b>	<b>222,942.28</b>	<b>100%</b>	<b>\$5,331,043.81</b>	<b>100%</b>
<b>2010-2013 Percent Change</b>	<b>-5.58%</b>	<b>-</b>	<b>-4.18%</b>	<b>-</b>	<b>14.27%</b>	<b>-</b>

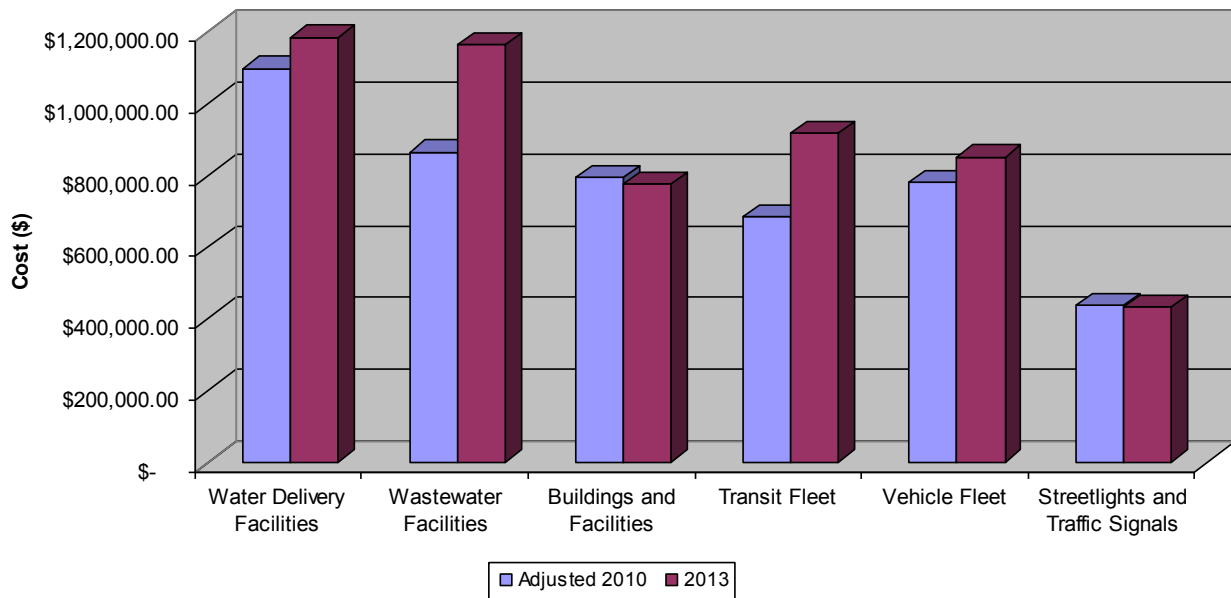
**Figure 1: Energy Consumption by City Government Sector 2010-2013 Comparison**



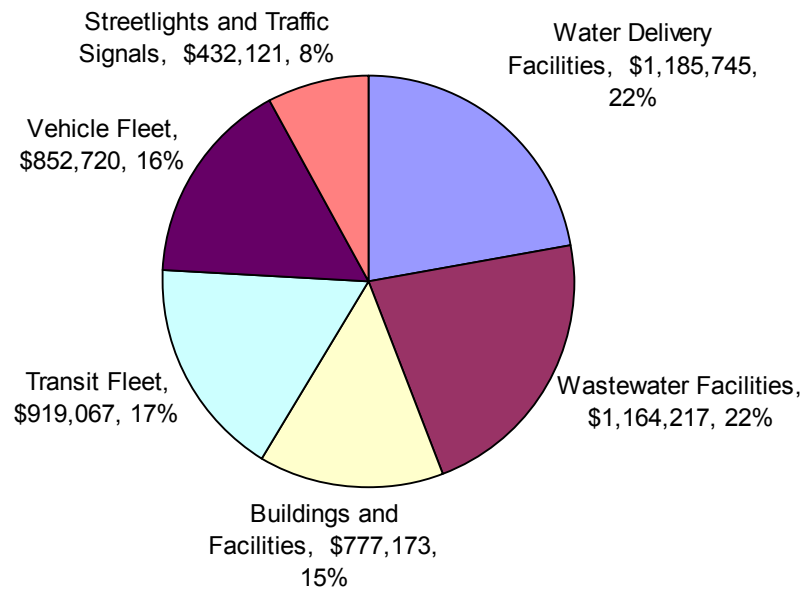
**Figure 2: Energy Consumption by City Government Sector (2013)**



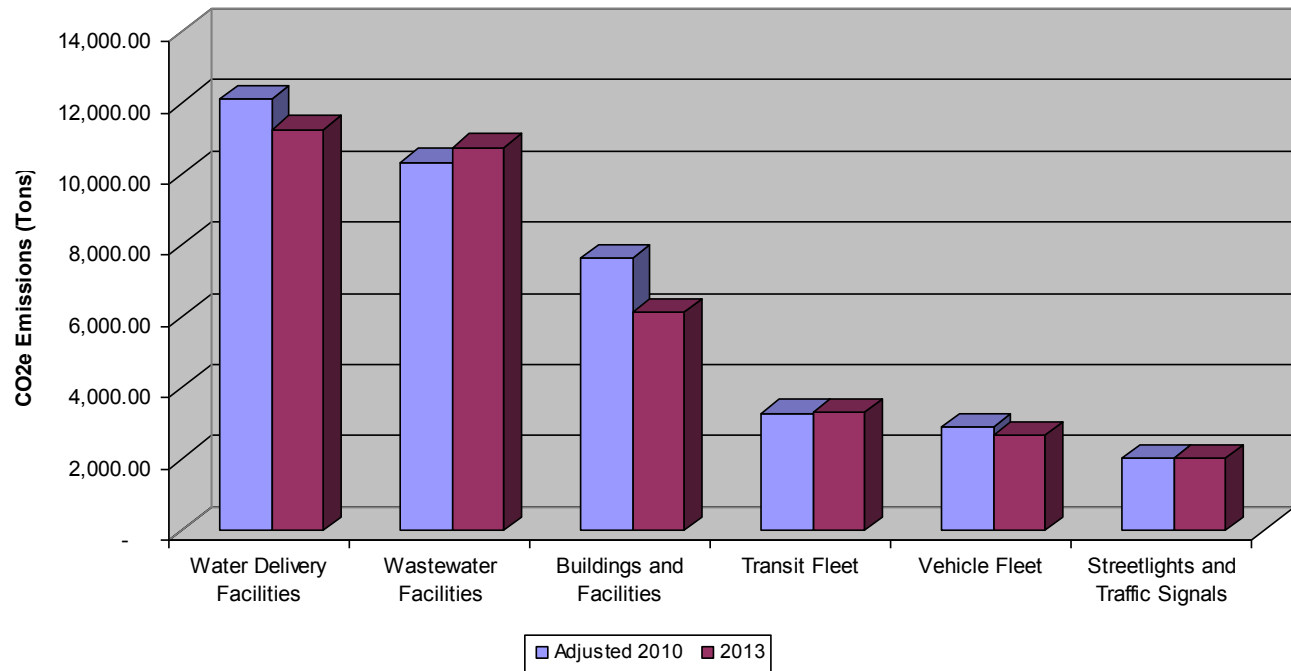
**Figure 3: Cost of Energy by City Government Sector 2010-2013 Comparison**



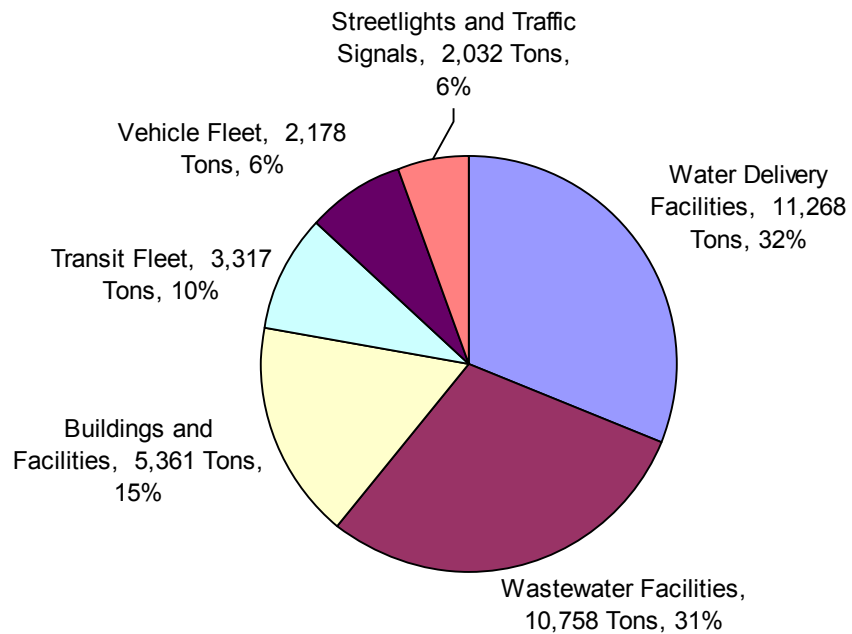
**Figure 4: Cost of Energy by City Government Sector (2013)**



**Figure 5: CO<sub>2</sub>e Emissions by City Government Sector 2010-2013 Comparison**



**Figure 6: CO<sub>2</sub>e Emissions by City Government Sector (2013)**



As figures 1 and 5 illustrate, nearly all City Government Sectors experienced a decrease over the analysis period. Figure 3 on the other hand illustrates how, even in light of



these energy decreases, utility rates for energy rose, yielding higher total costs for energy. Finally, figures 2, 4 and 6 illustrate the percentage composition of energy consumption, energy costs and CO<sub>2</sub>e emissions by City Government Sector for 2013.

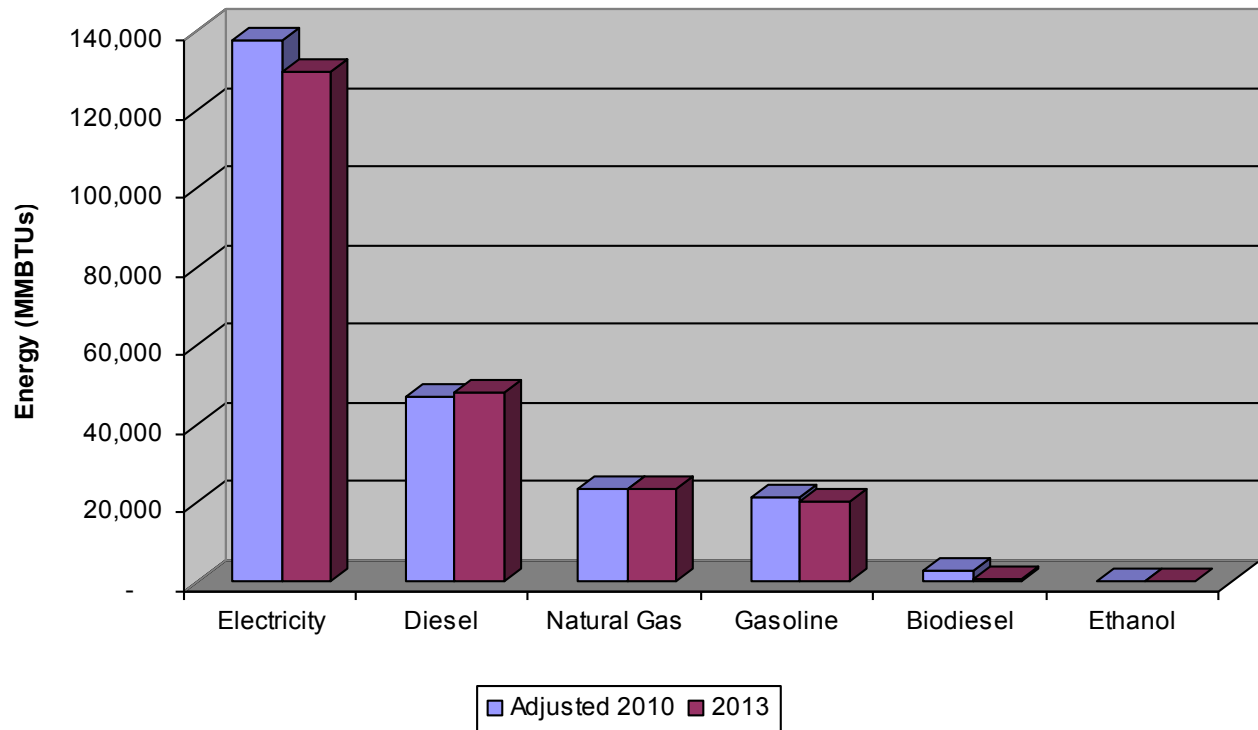
## Local Government Energy Consumption, Cost, and Emissions by Source

City Government energy consumption, cost, and emissions are dominated by purchased electricity, which is largely produced from coal in Bloomington and Indiana generally. Purchased electricity comprises 58% of the City's total energy consumption, 64% of total energy expenditures and 80% of total CO<sub>2</sub>e emissions. The City's purchased electricity is also experiencing the most rapid increase in cost, growing 13% even with the City's reductions to electricity consumption. Diesel fuel, natural gas, gasoline, and biodiesel and ethanol fuel additives collectively comprise the City's remaining 42% of energy consumption, 36% of total energy expenditures and 20% of CO<sub>2</sub>e emissions.

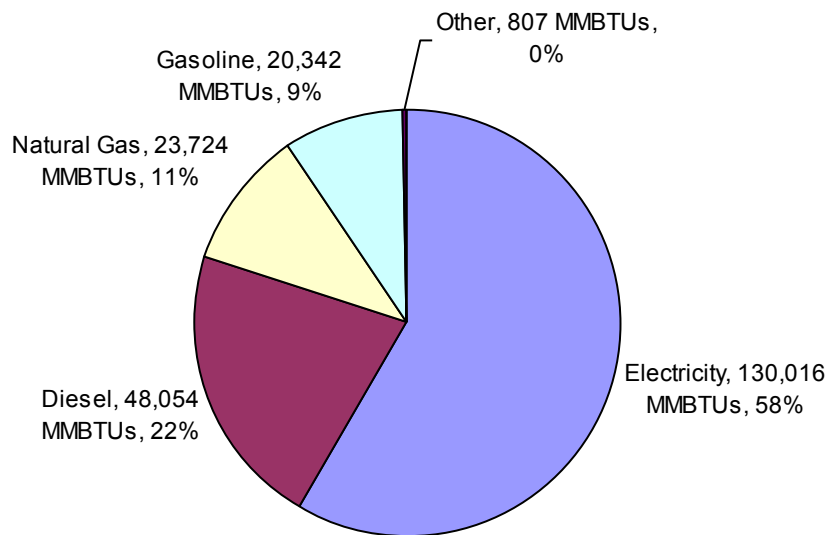
Table 3 and Figures 7-12 illustrate this data and how the City's energy composition has changed since 2010.

<b>Table 3: Energy Consumption, Cost and Emissions by Source</b>						
<b>Energy Source</b>	<b>CO<sub>2</sub>e (tons)</b>	<b>CO<sub>2</sub>e (%)</b>	<b>Energy Use (MMBTUs)</b>	<b>Energy Use (%)</b>	<b>Cost (\$)</b>	<b>Cost (%)</b>
<b>Adjusted 2010</b>						
Electricity	30,474	79.53%	137,605	59.14%	\$3,006,520.09	64.44%
Diesel	4,113	10.73%	46,954	20.18%	\$ 936,915.00	20.08%
Natural Gas	1,665	4.35%	23,746	10.21%	\$ 192,539.19	4.13%
Gasoline	1,826	4.77%	21,605	9.29%	\$ 477,110.00	10.23%
Other*	240	0.63%	2,762	1.19%	\$ 52,421.00	1.12%
<b>Total</b>	<b>38,318</b>	<b>100%</b>	<b>232,672</b>	<b>100%</b>	<b>\$4,665,505.28</b>	<b>100%</b>
<b>2013</b>						
Electricity	28,793.21	79.58%	130,015.80	58.32%	\$3,388,626.01	63.56%
Diesel	4,209.14	11.63%	48,053.61	21.55%	\$1,182,737.44	22.19%
Natural Gas	1,389.00	3.84%	23,723.77	10.64%	\$ 170,631.12	3.20%
Gasoline	1,719.44	4.75%	20,341.99	9.12%	\$ 564,692.60	10.59%
Biodiesel	54.37	0.15%	624.02	0.28%	\$ 17,490.94	0.33%
Ethanol	15.20	0.04%	183.09	0.08%	\$ 6,865.70	0.13%
<b>Total</b>	<b>36,180.37</b>	<b>100%</b>	<b>222,942.28</b>	<b>100%</b>	<b>\$5,331,043.81</b>	<b>100%</b>
<b>2010-2013 Percent Change</b>	<b>-5.58%</b>	<b>-</b>	<b>-4.18%</b>	<b>-</b>	<b>14.27%</b>	<b>-</b>
**"Other" included Biodiesel (B100) and Ethanol fuels.						

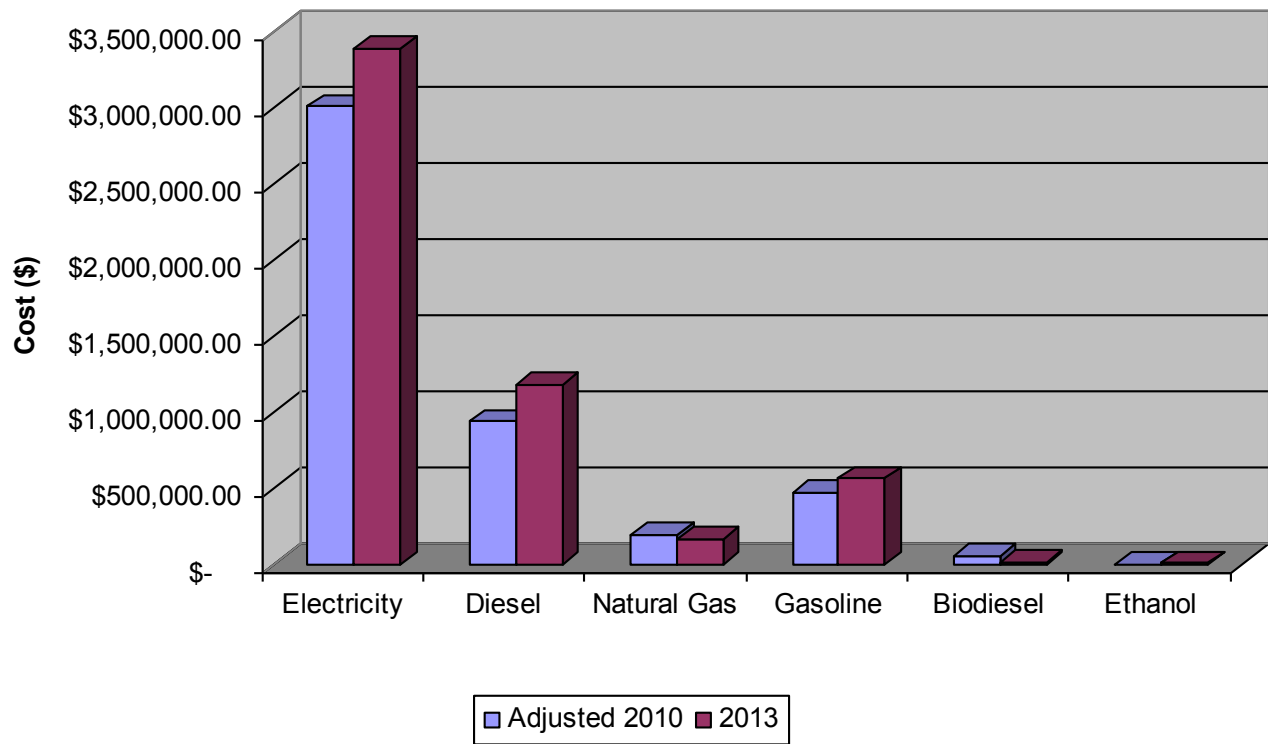
**Figure 7: City Energy Use by Energy Source 2010-2013 Comparison**



**Figure 8: Energy Consumption by Energy Source for City Operations (2013)**



**Figure 9: City Energy Expenditures by Energy Source 2010-2013 Comparison**



**Figure 10: Energy Expenditures by Energy Source (2013)**

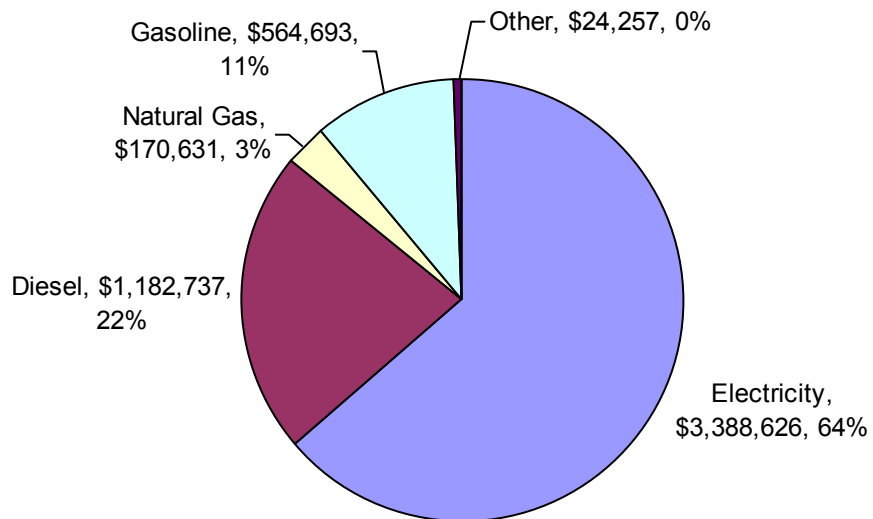


Figure 11: City CO<sub>2</sub>e Emissions by Energy Source 2010-2013 Comparison

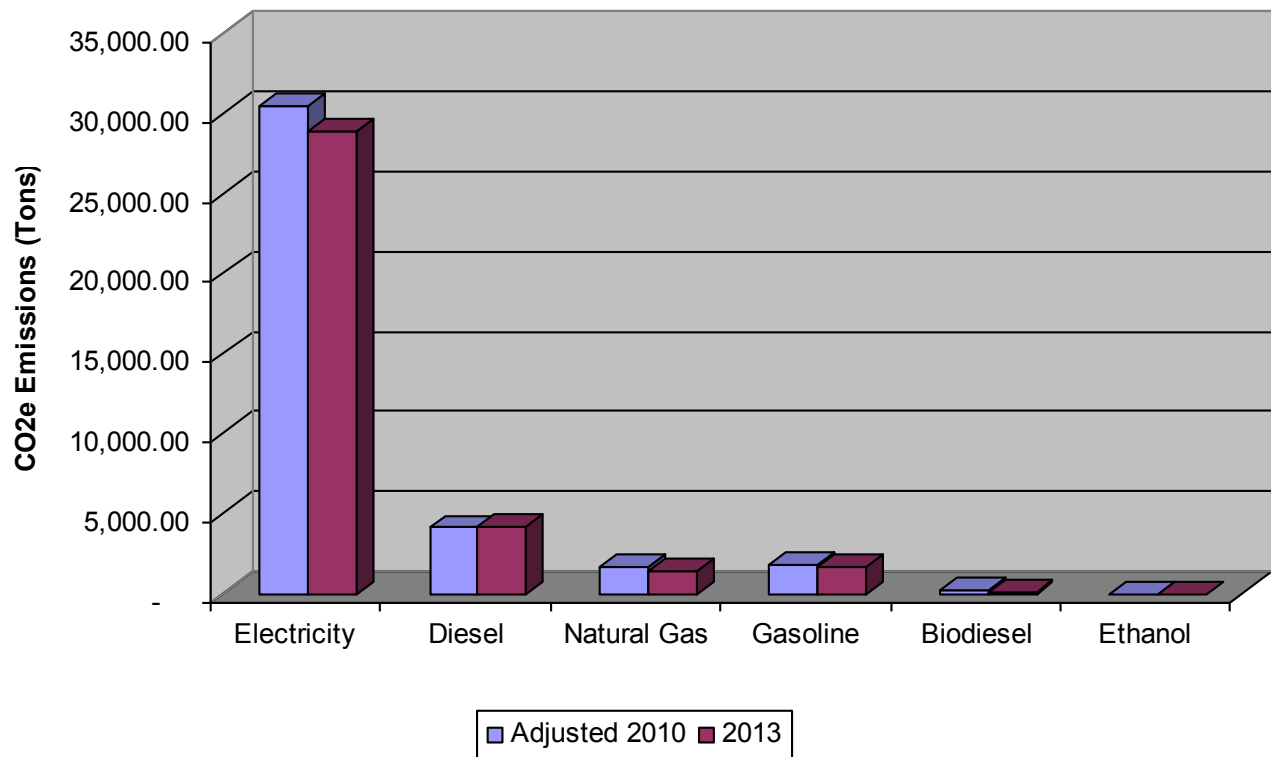
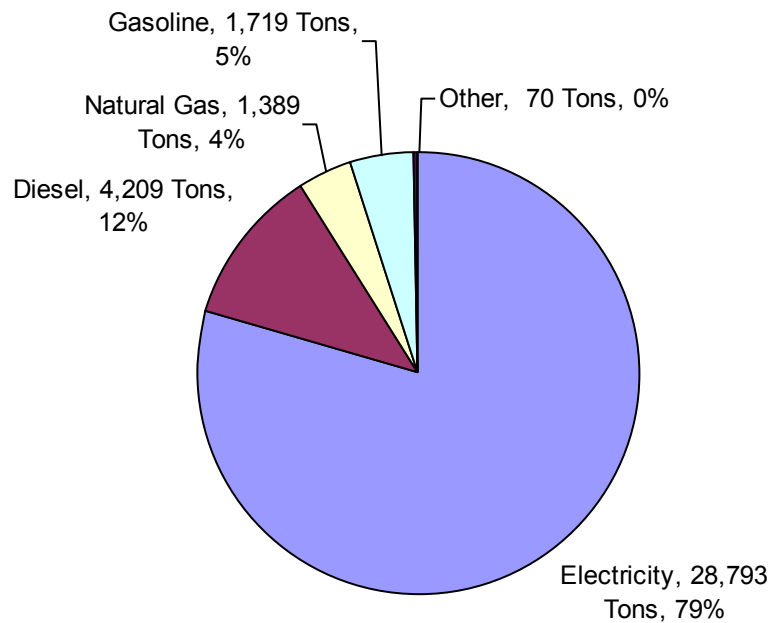


Figure 12: City CO<sub>2</sub>e Emissions by Energy Source (2013)



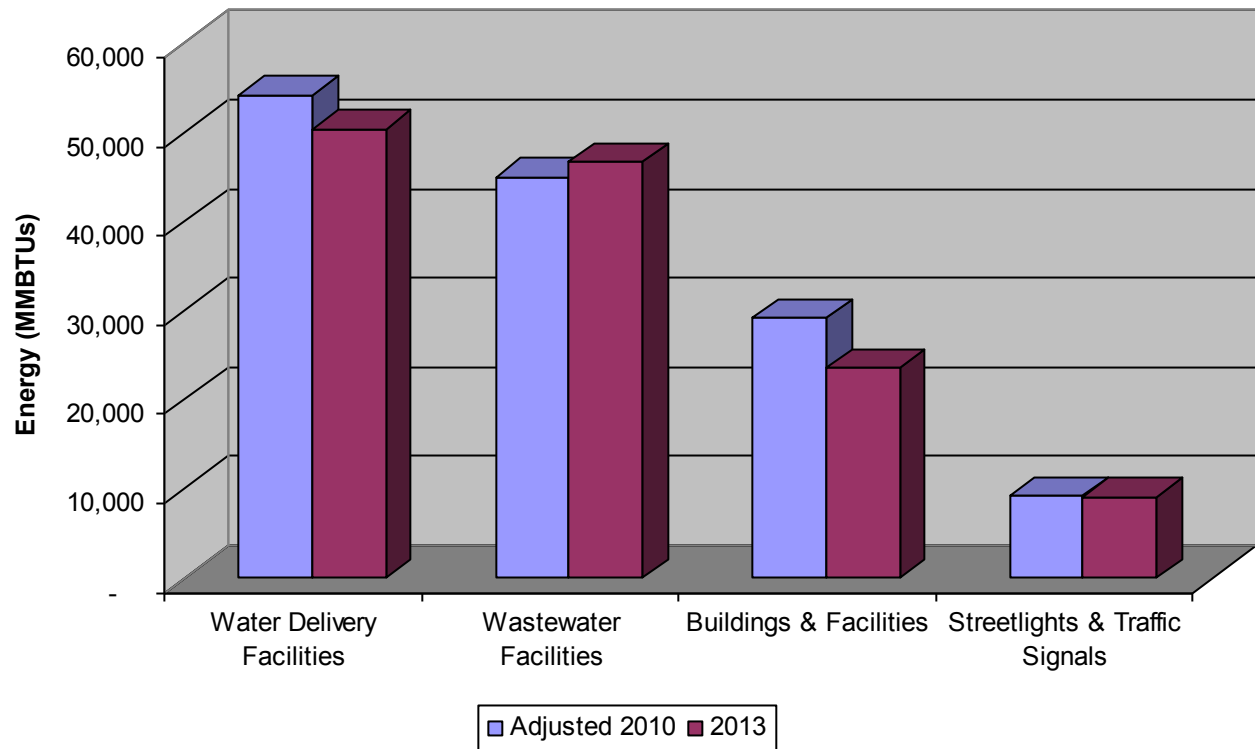
## Electricity Consumption Breakdown

City of Bloomington Utilities (CBU) continues to account for the majority of electricity consumption. CBU services collectively account for 75% of the City's total electricity consumption, 68% of total electricity expenditures and 75% of total CO<sub>2</sub>e electricity-derived emissions. These percentages remain largely unchanged from 2010 due to the City's overall reductions in electricity consumption even as the water delivery service reduced consumption by over 3,700 MMBTUs. The City's remaining buildings, non-water delivery or treatment facilities and streetlights and traffic signals account for 25% of total electricity consumption, 32% of total electricity expenditures and 25% of electricity CO<sub>2</sub>e emissions.

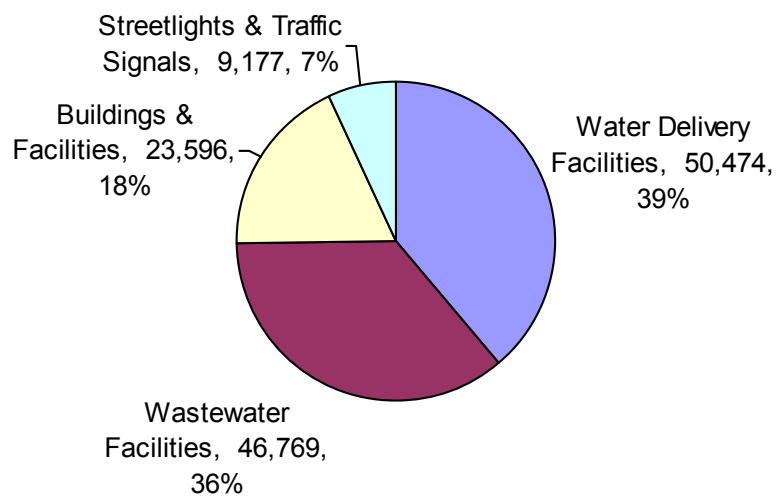
Table 4 and figures 13-18 illustrate this data and how electricity was divided among City government operations in 2013. Given that CBU accounts for such a large percentage of total electricity consumption, Figure 19 is provided below to illustrate how and where electricity is being consumed in CBU operations.

<b>Table 4: Electricity Use by City Government Sector</b>						
<b>Sector</b>	<b>CO<sub>2</sub>e (tons)</b>	<b>CO<sub>2</sub>e (%)</b>	<b>Energy Use (MMBTUs)</b>	<b>Energy Use (%)</b>	<b>Cost (\$)</b>	<b>Cost (%)</b>
<b>Adjusted 2010</b>						
Water Delivery Facilities	12,002.04	39.38%	54,195.21	39.38%	\$1,081,119.82	35.96%
Wastewater Facilities	9,977.03	32.74%	45,051.32	32.74%	\$ 818,212.97	27.21%
Buildings & Facilities	6,461.47	21.20%	29,177	21.20%	\$ 668,838.00	22.25%
Streetlights & Traffic Signals	2,033.44	6.67%	9,182	6.67%	\$ 438,456.00	14.58%
<b>Total</b>	<b>30,473.98</b>	<b>100.00%</b>	<b>137,605.31</b>	<b>100.00%</b>	<b>\$3,006,626.79</b>	<b>100.00%</b>
<b>2013</b>						
Water Delivery Facilities	11,177.91	38.82%	50,473.89	38.82%	\$1,173,863.47	34.64%
Wastewater Facilities	10,357.38	35.97%	46,768.75	35.97%	\$1,116,166.71	32.94%
Buildings & Facilities	5,225.61	18.15%	23,596.25	18.15%	\$ 666,474.36	19.67%
Streetlights & Traffic Signals	2,032.31	7.06%	9,176.91	7.06%	\$ 432,121.47	12.75%
<b>Total</b>	<b>28,793.21</b>	<b>100.00%</b>	<b>130,015.80</b>	<b>100.00%</b>	<b>\$3,388,626.01</b>	<b>100.00%</b>
<b>2010-2013 Percent Change</b>	<b>-5.52%</b>	<b>-</b>	<b>-5.52%</b>	<b>-</b>	<b>12.71%</b>	<b>-</b>

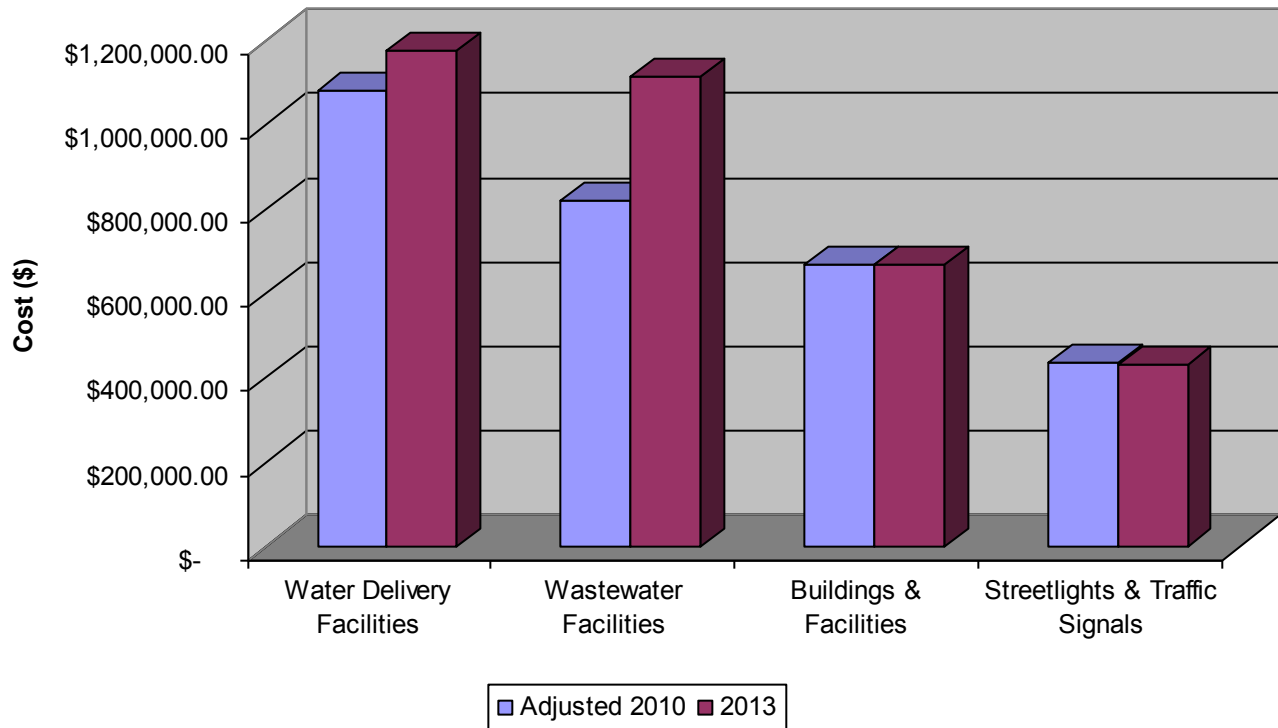
**Figure 13: Electricity Consumption by City Government Sector 2010-2013 Comparison**



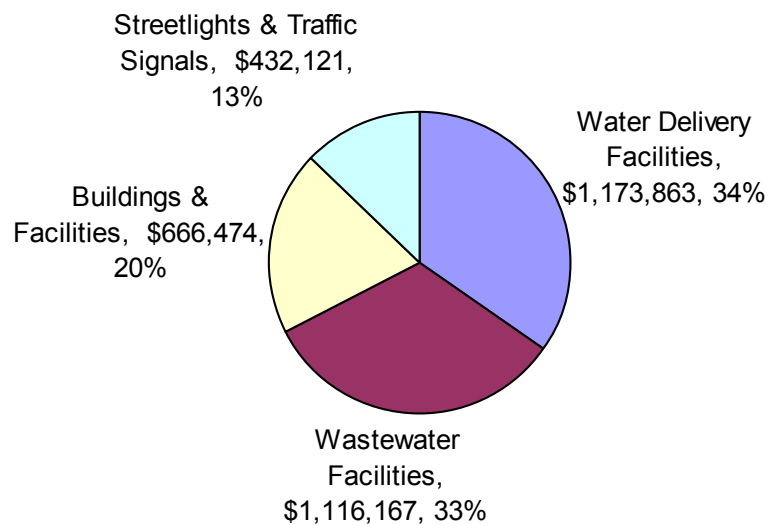
**Figure 14: Electricity Consumption by City Government Sector (2013)**



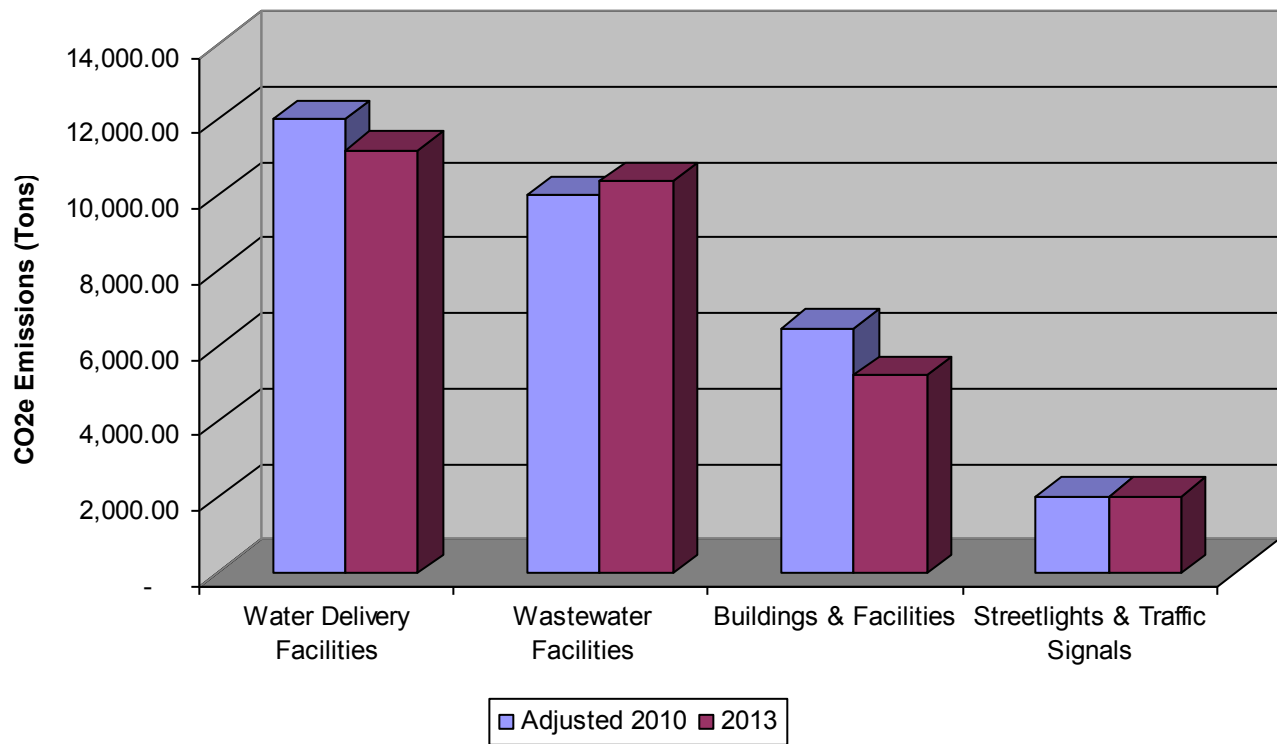
**Figure 15: Electricity Expenditures by City Government Sector 2010-2013 Comparison**



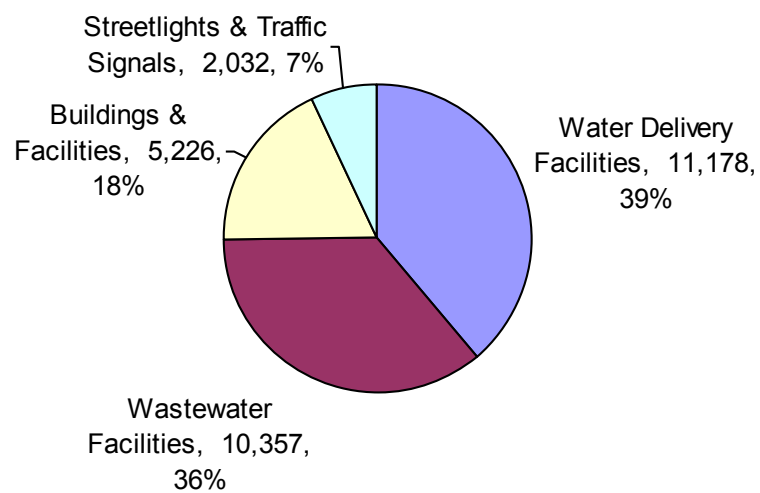
**Figure 16: Electricity Expenditures by City Government Sector**



**Figure 17: CO<sub>2</sub>e Emissions from Electricity Consumption by City Government Sector 2010-2013 Comparison**

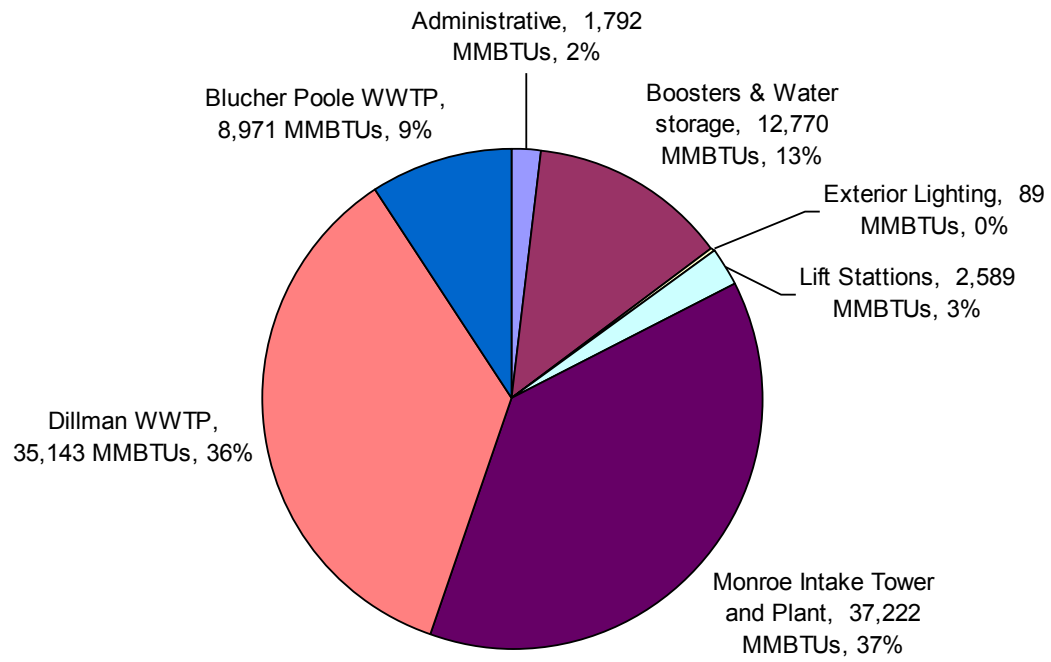


**Figure 18: CO<sub>2</sub>e Emissions from Electricity Consumption by City Government Sector**





**Figure 19: Electricity Use by All CBU Water Delivery and Wastewater Facilities (2013)**



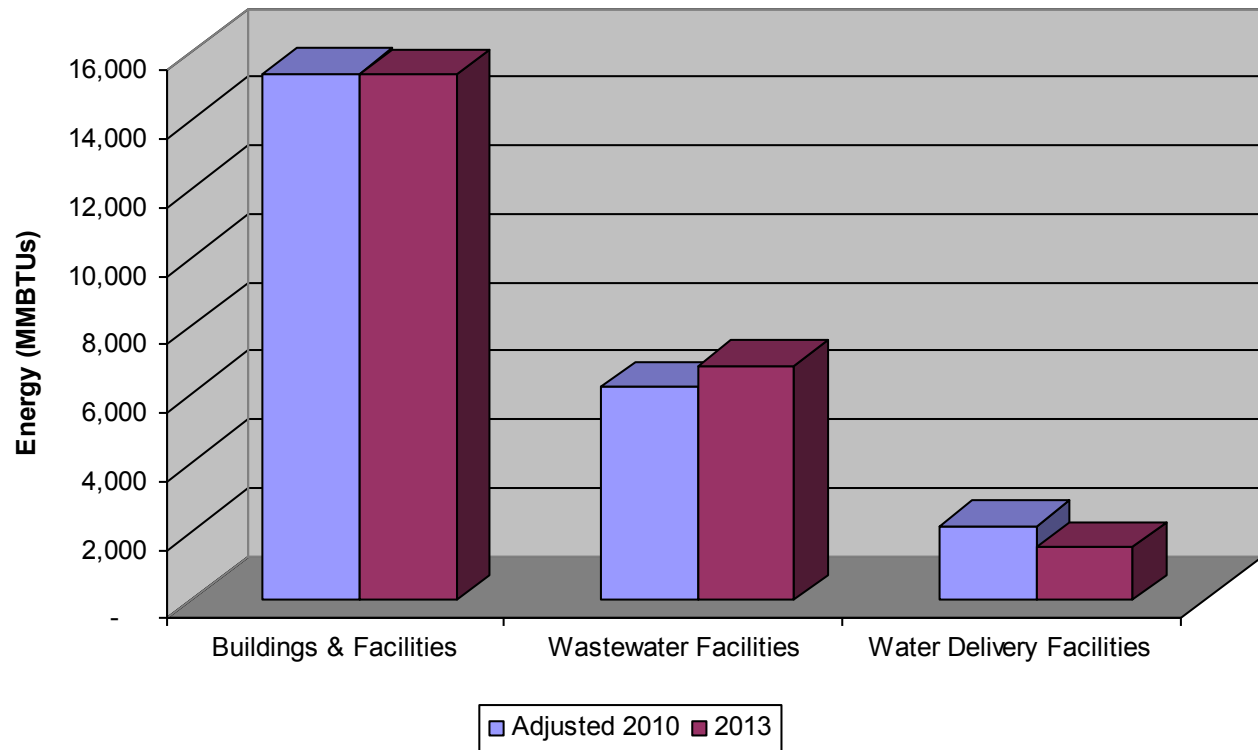
## Natural Gas Consumption Breakdown

Since 2010, City government operations have achieved modest reductions in natural gas consumption. The City's largest consumer of natural gas remains buildings and facilities, as it was in 2010, though reduction have been made. Buildings and non-water facilities account for 65% of total City natural gas energy consumption, total expenditures and total CO<sub>2</sub>e emissions. CBU's wastewater facilities were the only City government sector to experience growth in natural gas consumption, accounting for 29% of total natural gas consumption, 28% of total expenditures and 29% of total CO<sub>2</sub>e emissions in 2013. Finally, CBU's water delivery services experienced sizable reduction in natural gas consumption, accounting for 6% of natural gas consumption, 7% of total expenditures and 6% of total CO<sub>2</sub>e emissions in 2013.

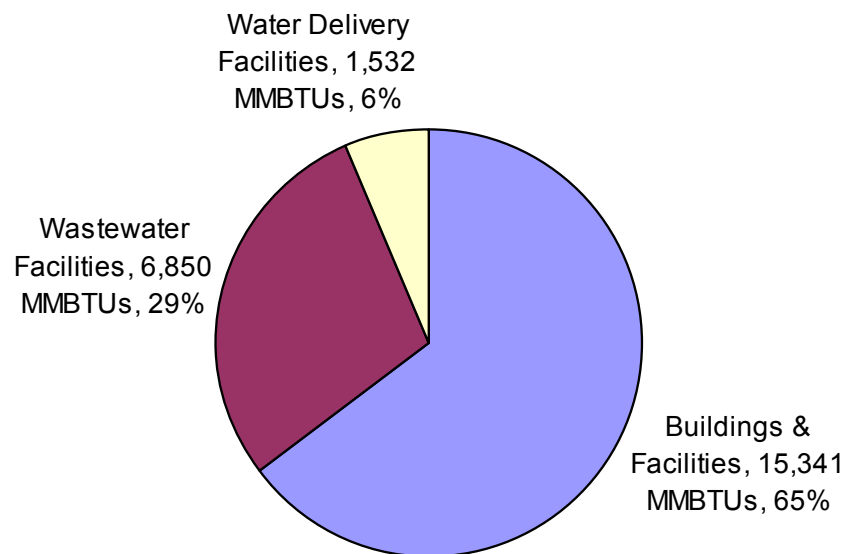
Table 5 and figures 20-25 illustrate this data and how natural gas consumption was divided among City Government operations in 2013.

<b>Table 5: Natural Gas Consumption by City Government Sector</b>						
<b>Sector</b>	<b>CO<sub>2</sub>e (tons)</b>	<b>CO<sub>2</sub>e (%)</b>	<b>Energy Use (MMBTUs)</b>	<b>Energy Use (%)</b>	<b>Cost (\$)</b>	<b>Cost (%)</b>
<b>Adjusted 2010</b>						
Buildings & Facilities	1,174.75	70.55%	15,370.37	64.73%	\$126,656.56	65.78%
Wastewater Facilities	363.46	21.83%	6,207.72	26.14%	\$ 47,910.21	24.88%
Water Delivery Facilities	126.92	7.62%	2,167.74	9.13%	\$ 17,972.42	9.33%
<b>Total</b>	<b>1,665.12</b>	<b>100.00%</b>	<b>23,745.82</b>	<b>100.00%</b>	<b>\$192,539.19</b>	<b>100.00%</b>
<b>2013</b>						
Buildings & Facilities	898.21	64.67%	15,341.24	64.67%	\$110,698.70	64.88%
Wastewater Facilities	401.07	28.87%	6,850.14	28.87%	\$ 48,050.69	28.16%
Water Delivery Facilities	89.72	6.46%	1,532.39	6.46%	\$ 11,881.73	6.96%
<b>Total</b>	<b>1,389.00</b>	<b>100.00%</b>	<b>23,723.77</b>	<b>100.00%</b>	<b>\$170,631.12</b>	<b>100.00%</b>
<b>2010-2013 Percent Change</b>	<b>-16.58%</b>	<b>-</b>	<b>-0.09%</b>	<b>-</b>	<b>-11.38%</b>	<b>-</b>

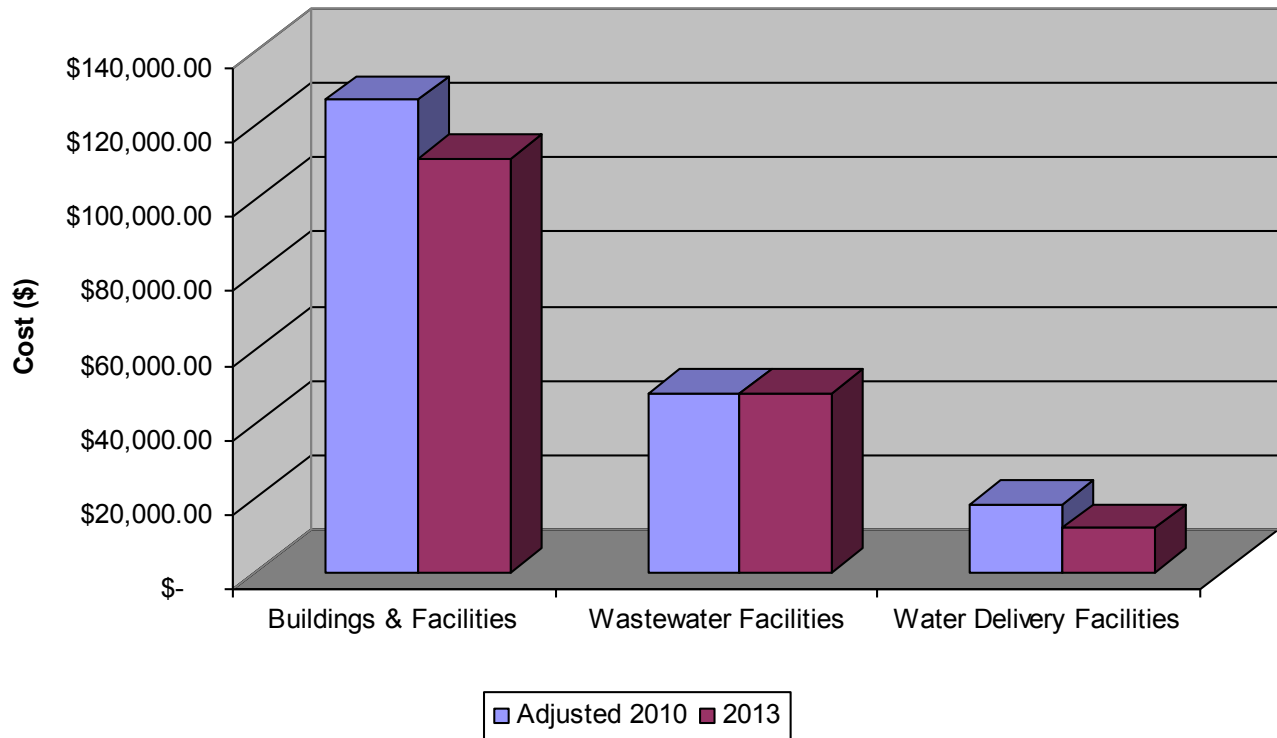
**Figure 20: Natural Gas Consumption by City Government Sector 2010-2013 Comparison**



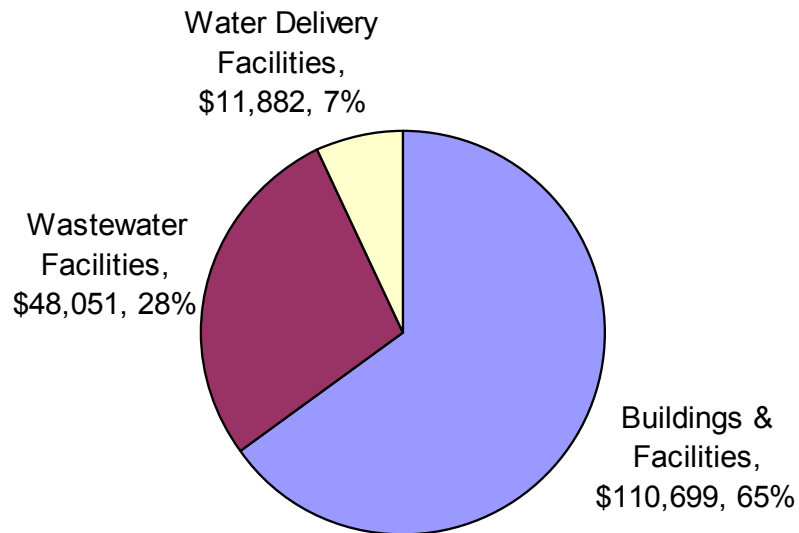
**Figure 21: Natural Gas Consumption by City Government Sector (2013)**



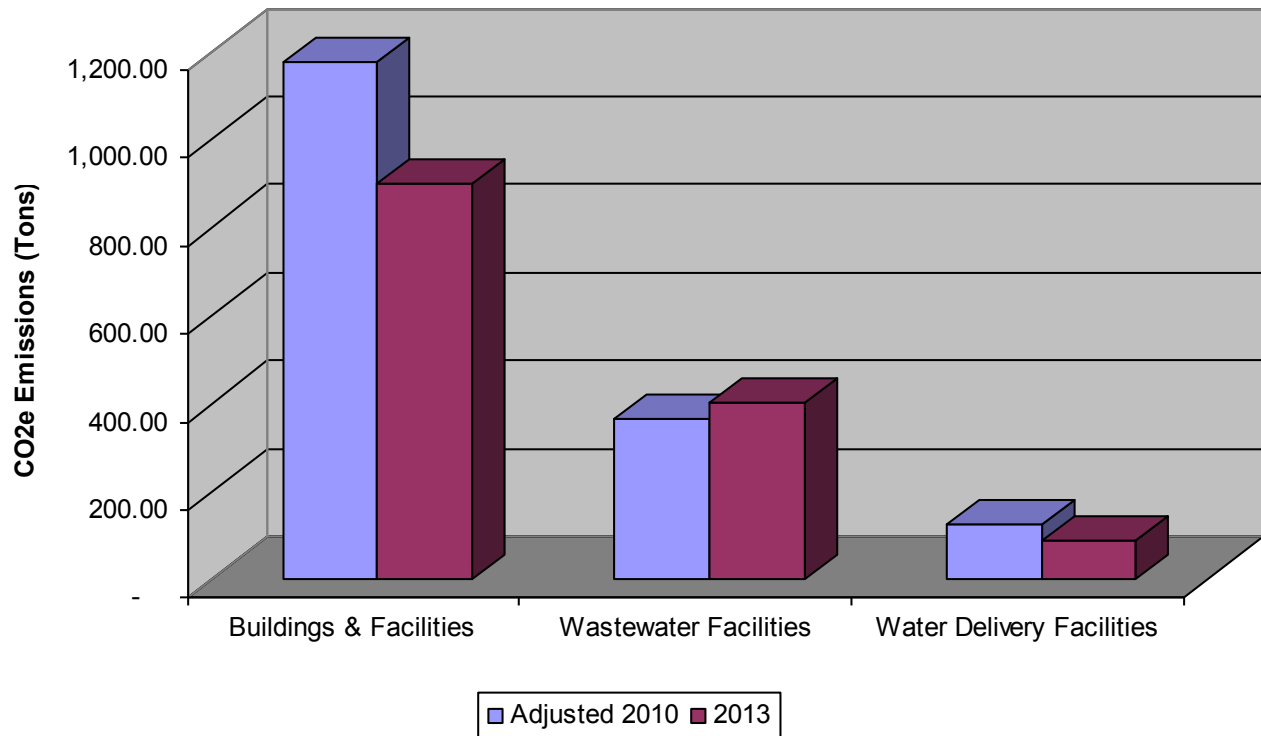
**Figure 22: Natural Gas Expenditures by City Government Sector 2010-2013 Comparison**



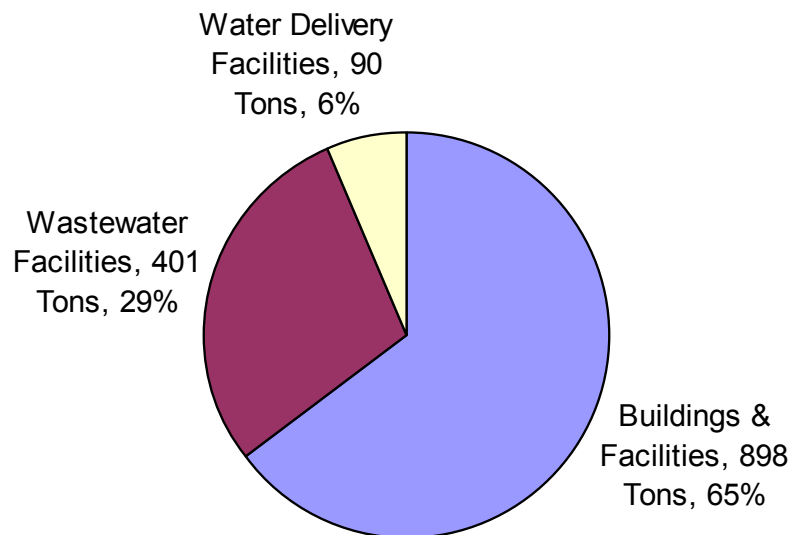
**Figure 23: Natural Gas Expenditures by City Government Sector (2013)**



**Figure 24: Natural Gas CO<sub>2</sub>e Emissions by City Government Sector 2010-2013 Comparison**



**Figure 25: Natural Gas CO<sub>2</sub>e Emissions by City Government Sector (2013)**



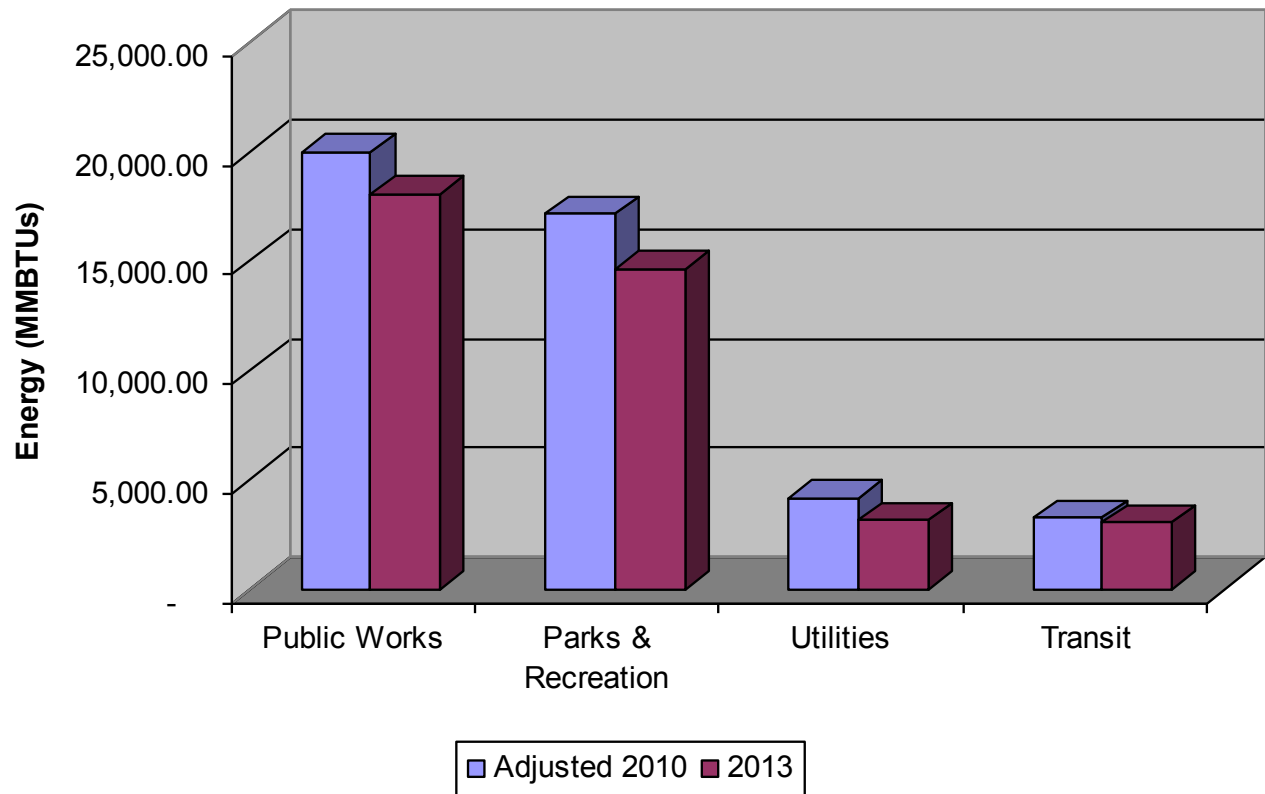
## Buildings and Non-Water Treatment Facilities Breakdown

As previously mentioned City buildings and non-water treatment facilities experienced the largest reduction in energy consumption and CO<sub>2</sub>e emissions and highest avoided energy expenditures. Over the analysis period, City buildings and non-water treatment facilities reduced total energy consumption by roughly 5,500 MMBTUs (13%) and decreased annual CO<sub>2</sub>e emissions by 1,500 tons (20%). Additionally, this City government sector was one of only two which experienced a decline in total expenditures, cutting more than \$18,000 (2%), even in light of the rising cost of energy. Though each City government department experienced energy reductions, the order of largest to smallest users remains unchanged from 2010, with Public Works using the largest amount of energy followed by Parks and Recreation, CBU and finally Bloomington Transit.

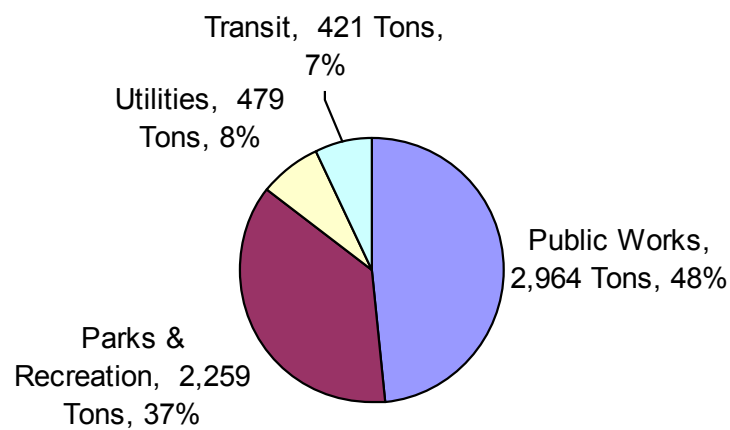
Table 6 and figures 26-30 illustrate this data and how electricity and natural gas consumption was divided among these City Government Departments in 2013.

Table 6: Energy Consumption, Costs and Emissions by City Department (Buildings and Non-Water Treatment Facilities Only)							
Department	Utility	CO <sub>2</sub> e (tons)	CO <sub>2</sub> e (%)	Energy Use (MMBTUs)	Energy Use (%)	Cost (\$)	Cost (%)
<b>Adjusted 2010</b>							
<b>Public Works</b>	Electricity	3,010.12	88.91%	13,592	67.93%	\$ 312,712.48	85.44%
	Natural Gas	375.63	11.09%	6,416	32.07%	\$ 53,275.83	14.56%
<b>Subtotal: Public Works</b>		<b>3,385.75</b>	<b>44.34%</b>	<b>20,007.91</b>	<b>44.91%</b>	<b>\$ 365,988.31</b>	<b>46.01%</b>
<b>Parks &amp; Recreation</b>	Electricity	2,561.40	88.68%	11,566.00	67.44%	\$ 271,014.00	85.13%
	Natural Gas	326.94	11.32%	5,584.00	32.56%	\$ 47,349.00	14.87%
<b>Subtotal: Parks &amp; Rec.</b>		<b>2,888.34</b>	<b>37.82%</b>	<b>17,150.00</b>	<b>38.50%</b>	<b>\$ 318,363.00</b>	<b>40.03%</b>
<b>Utilities</b>	Electricity	543	84.63%	2,452	59.29%	\$ 54,952.82	79.32%
	Natural Gas	99	15.37%	1,684	40.71%	\$ 14,325.73	20.68%
<b>Subtotal: Utilities</b>		<b>641.51</b>	<b>8.40%</b>	<b>4,135.25</b>	<b>9.28%</b>	<b>\$ 69,278.55</b>	<b>8.71%</b>
<b>B Transit</b>	Electricity	347	48.16%	1,567	48.16%	\$ 30,052.00	71.97%
	Natural Gas	374	51.84%	1,687	51.84%	\$ 11,706.00	28.03%
<b>Subtotal: B Transit</b>		<b>720.63</b>	<b>9.44%</b>	<b>3,254.00</b>	<b>7.30%</b>	<b>\$ 41,758.00</b>	<b>5.25%</b>
<b>Total</b>		<b>7,636</b>	<b>100%</b>	<b>44,547</b>	<b>100%</b>	<b>\$ 795,387.86</b>	<b>100%</b>
<b>2013</b>							
<b>Public Works</b>	Electricity	2,590.88	87.42%	11,699.10	64.75%	\$ 336,352.27	87.21%
	Natural Gas	372.83	12.58%	6,367.86	35.25%	\$ 49,341.00	12.79%
<b>Subtotal: Public Works</b>		<b>2,963.71</b>	<b>48.40%</b>	<b>18,066.96</b>	<b>46.40%</b>	<b>\$ 385,693.27</b>	<b>49.63%</b>
<b>Parks &amp; Recreation</b>	Electricity	1,904.50	84.29%	8,599.79	58.65%	\$ 265,103.76	85.45%
	Natural Gas	354.96	15.71%	6,062.54	41.35%	\$ 45,139.48	14.55%
<b>Subtotal: Parks &amp; Rec.</b>		<b>2,259.46</b>	<b>36.90%</b>	<b>14,662.33</b>	<b>37.66%</b>	<b>\$ 310,243.24</b>	<b>39.92%</b>
<b>Utilities</b>	Electricity	400.44	83.53%	1,808.21	57.27%	\$ 45,412.85	82.27%
	Natural Gas	78.99	16.47%	1,349.05	42.73%	\$ 9,787.00	17.73%
<b>Subtotal: Utilities</b>		<b>479.43</b>	<b>7.83%</b>	<b>3,157.26</b>	<b>8.11%</b>	<b>\$ 55,199.85</b>	<b>7.10%</b>
<b>B Transit</b>	Electricity	329.79	78.29%	1,489.15	48.81%	\$ 19,605.48	75.30%
	Natural Gas	91.44	21.71%	1,561.79	51.19%	\$ 6,431.22	24.70%
<b>Subtotal: B Transit</b>		<b>421.23</b>	<b>6.88%</b>	<b>3,050.94</b>	<b>7.84%</b>	<b>\$ 26,036.70</b>	<b>3.35%</b>
<b>Total</b>		<b>6,123.82</b>	<b>100%</b>	<b>38,937.49</b>	<b>100%</b>	<b>\$ 777,173.06</b>	<b>100%</b>
<b>2010-2013 Percent Change</b>		<b>-19.81%</b>	<b>-</b>	<b>-12.59%</b>	<b>-</b>	<b>-2.29%</b>	<b>-</b>

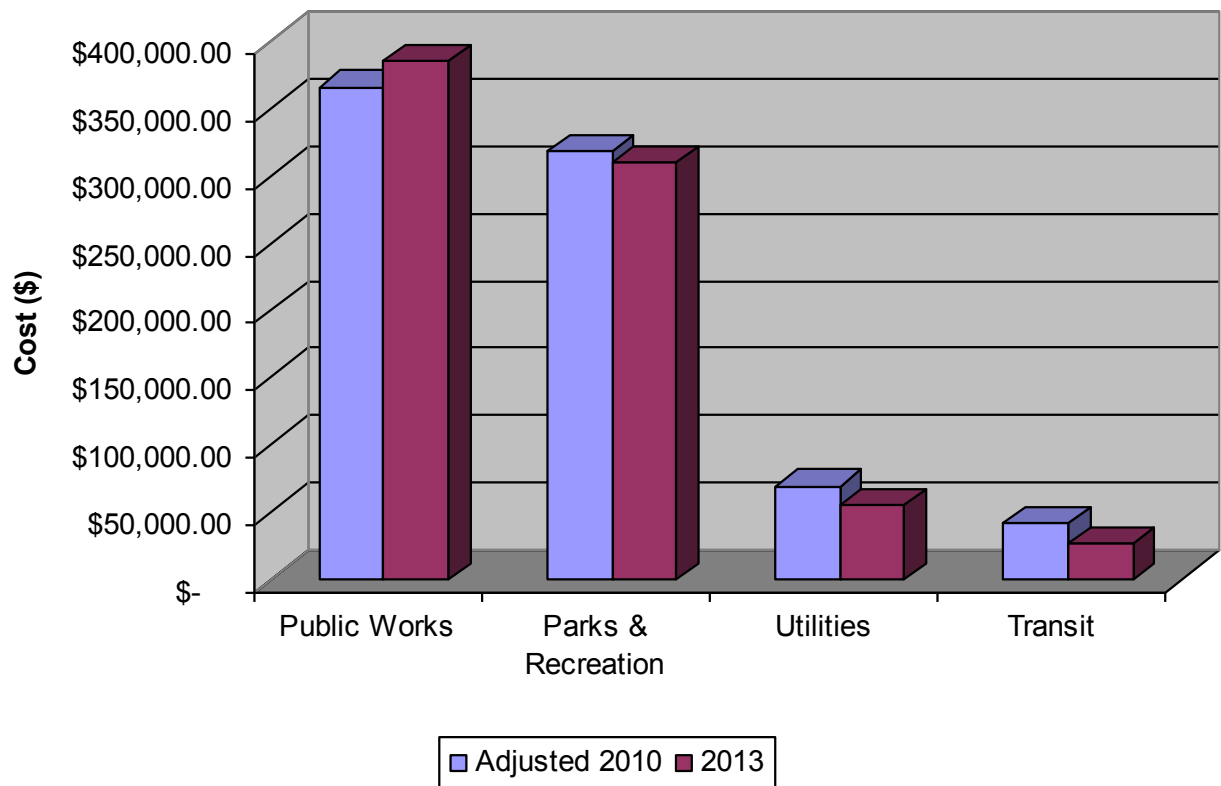
**Figure 25: Energy Consumption by City Government Department (Buildings and Non-Water Treatment Facilities only) 2010-2013 Comparison**



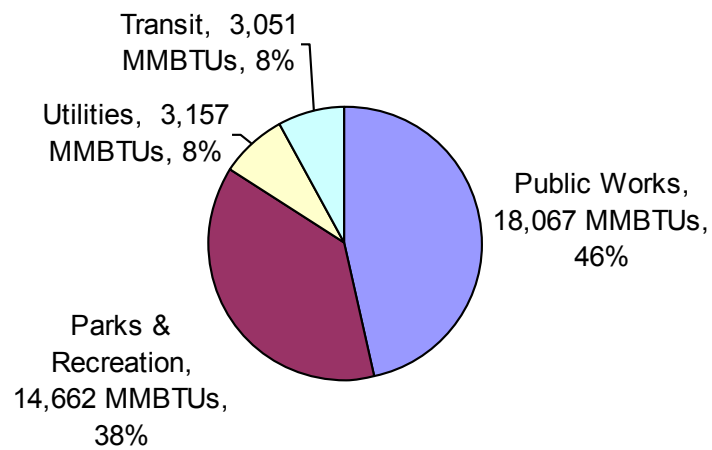
**Figure 26: Energy Consumption by City Government Department (Buildings and Non-Water Treatment Facilities only) (2013)**



**Figure 27: Energy Expenditures by City Government Department (Buildings and Non-Water Treatment Facilities only) 2010-2013 Comparison**

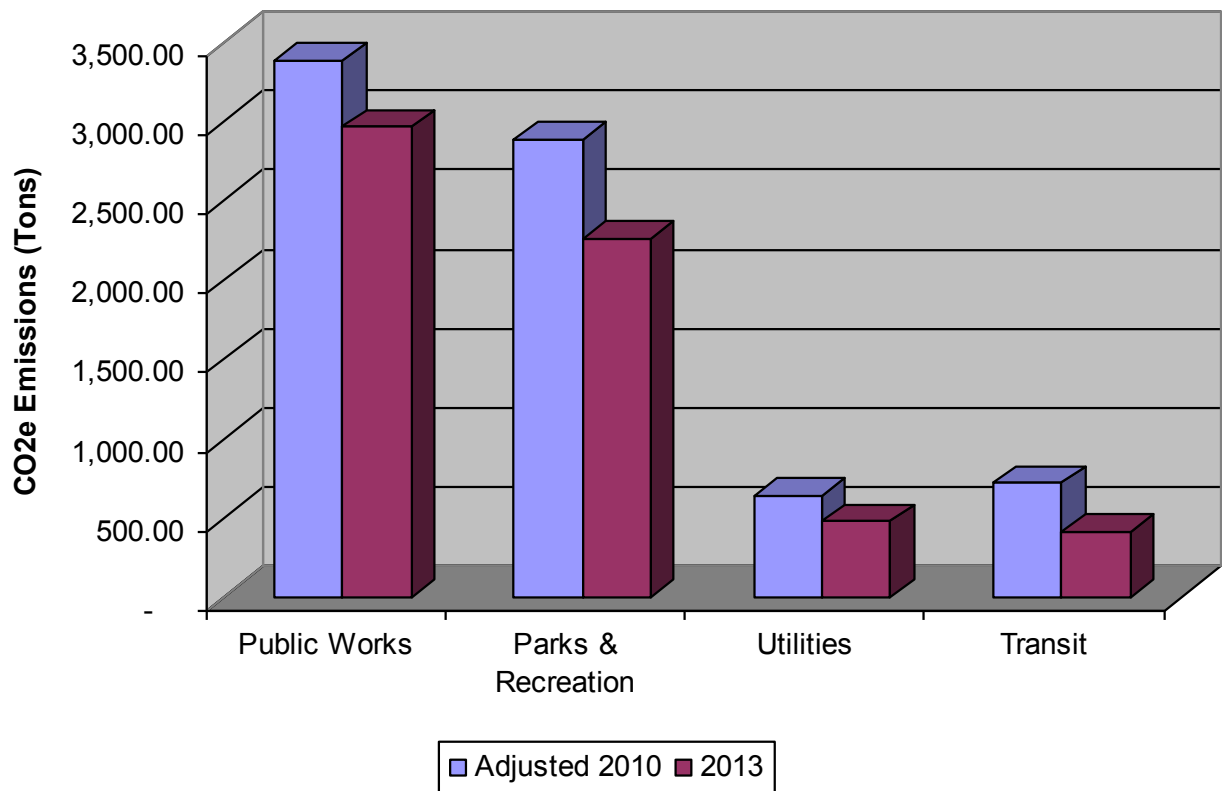


**Figure 28: Energy Expenditures by City Government Department (Buildings and Non-Water Treatment Facilities only) (2013)**

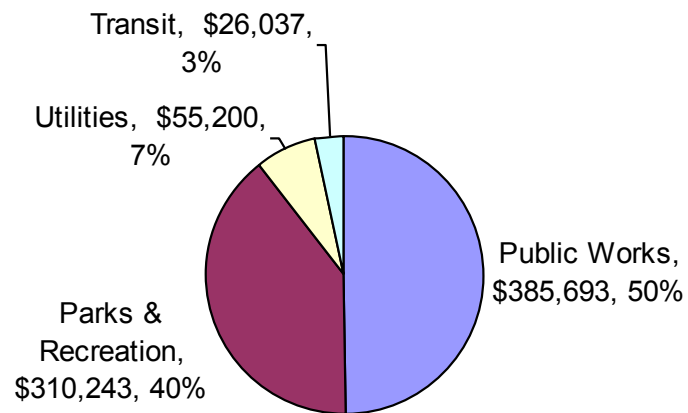




**Figure 29: CO<sub>2</sub>e Emissions by City Government Department (Buildings and Non-Water Treatment Facilities only) 2010-2013 Comparison**



**Figure 30: CO<sub>2</sub>e Emissions by City Government Department (Buildings and Non-Water Treatment Facilities only) (2013)**



As the above figures illustrate, the Public Works and Parks and Recreation Departments remain the City's dominant users of both electricity and natural gas for buildings and non-water treatment facilities. Though each department reduced their electricity consumption by over 1,800 MMBTUs, Public Works also reduced natural gas consumption while Parks and Recreation experienced an increase in consumption. This information, and the information present on CBU and Bloomington Transit reductions, is useful in determining which projects have had the largest effect and where. Additionally, seeing which departments are experiencing rapid reductions may aid other departments which are experiencing slower reductions (or even increases) in achieving greater energy reductions by modeling successful strategies.

Tables 7 and 8 below lend further insight into which buildings and facilities account for the largest share electricity and natural gas consumption.

<b>Table 7: Top 10 Electricity Consuming City Government Facilities</b>				
<b>Facility Name</b>	<b>Annual kWh</b>	<b>Annual Cost</b>	<b>kWh/ft<sup>2</sup></b>	<b>Cost/ft<sup>2</sup></b>
City Hall	1,153,218	\$ 103,935.97	19.00	\$ 1.71
TLRC / Sportsplex	929,120	\$ 83,826.81	9.49	\$ 0.86
Utilities Service Center	524,000	\$ 44,233.55	24.72	\$ 2.09
Police Headquarters	511,840	\$ 40,586.16	23.98	\$ 1.90
Frank Southern Center	499,001	\$ 47,077.85	18.05	\$ 1.70
Morton St. Garage	448,280	\$ 31,707.89	2.96	\$ 0.21
Grimes Transit Center	410,250	\$ 33,238.56	N/A	N/A
Walnut Street Garage	252,880	\$ 18,802.09	2.53	\$ 0.19
Twin Lakes	172,452	\$ 20,261.21	35.93	\$ 4.22
4th Street Garage	161,560	\$ 13,464.38	1.62	\$ 0.13

<b>Table 8: Top 10 Natural Gas Consuming City Government Facilities</b>				
<b>Facility Name</b>	<b>Annual Therms</b>	<b>Annual Cost</b>	<b>Therms/ft<sup>2</sup></b>	<b>Cost/ft<sup>2</sup></b>
Frank Southern Center	29,478.32	\$19,975.02	1.066	\$ 0.72
Animal Shelter	19,426.97	\$14,349.92	2.612	\$ 1.93
Grimes Transit Center	13,759.70	\$ 9,931.79	N/A	N/A
Utilities Service Center	13,491.00	\$ 9,787.00	0.636	\$ 0.46
TLRC / Sportsplex	10,392.48	\$ 8,168.42	0.107	\$ 0.08
Fleet	7,548.19	\$ 5,548.19	0.512	\$ 0.38
Banneker Community Center	6,602.46	\$ 4,888.96	0.642	\$ 0.48
Fire Station 4	4,950.40	\$ 3,933.96	0.665	\$ 0.53
Fire Station 1	4,832.07	\$ 3,848.18	0.400	\$ 0.32
Maint. Bldg 345 / Operations Center	4,799.01	\$ 3,486.44	1.846	\$ 1.34

## Vehicle Fleets

City government experienced several changes to the composition of fuels used in both the Bloomington Transit and departmental vehicle fleets. Bloomington Transit (BT) consumed diesel fuel and ethanol-blended gasoline (gasohol) in both 2010 and 2013, so there is no change in fuel type. Departmental vehicle fleets, however, experienced a change in the type of biodiesel consumed by fleet diesel vehicles. In 2010, records indicate that these departmental diesel vehicles were fueled by a 10% biodiesel blend (B10), which has since been reduced to a 5% blend (B5). This alteration is noticeable in the reduction in biodiesel consumption from 2010-2013. Collectively, both BT and the departmental fleets achieved a 2,100 MMBTU (3%) reduction in total vehicle energy consumption, while total fuel expenditures rose by over \$305,000 (21%), and total CO<sub>2</sub>e emissions fell by roughly 180 tons. The increase in price of vehicle fuels is second only to the increase in price for electricity over the analysis period.

Table 9 illustrates the total vehicle fuel data and how different City government departments consumed vehicle fuels in 2013. Figures 31-36 illustrate the breakdown in vehicle fuel consumption, associated expenditures and total emissions per fuel type. Figures 37 and 38 illustrate the division of biodiesel and gasoline consumption per non-transit department. Finally, Figures 39 and 40 illustrate the average amount of fuel consumed per vehicle in each of the non-transit City government departments.

Table 9: Vehicle Fuel Consumption Breakdown							
Department	Fuel Type	CO <sub>2</sub> e (tons)	CO <sub>2</sub> e (%)	Energy Use (MMBTUs)	Energy Use (%)	Cost (\$)	Cost (%)
<b>Adjusted 2010</b>							
<b>Transit Fleet</b>	Diesel	3,122.96	95.04%	35,653.24	94.86%	\$ 640,185.00	93.42%
	Ethanol	11.06	0.34%	133.13	0.35%	N/A	0.00%
	Gasoline	151.93	4.62%	1,797.40	4.78%	\$ 45,115.00	6.58%
<b>Transit Fleet Subtotals</b>		<b>3,285.94</b>	<b>53.18%</b>	<b>37,583.77</b>	<b>52.70%</b>	<b>\$ 685,300.00</b>	<b>46.73%</b>
<b>Vehicle Fleet</b>	Biodiesel	229.04	7.92%	2,628.58	7.79%	\$ 52,421.00	6.71%
	Diesel	989.83	34.21%	11,300.42	33.50%	\$ 296,730.00	37.99%
	Gasoline	1,674.31	57.87%	19,808.10	58.71%	\$ 431,995.00	55.30%
<b>Vehicle Fleet Subtotals</b>		<b>2,893.18</b>	<b>46.82%</b>	<b>33,737.10</b>	<b>47.30%</b>	<b>\$ 781,146.00</b>	<b>53.27%</b>
<b>Total</b>		<b>6,179.13</b>	<b>100%</b>	<b>71,320.87</b>	<b>100%</b>	<b>\$1,466,446.00</b>	<b>100%</b>
<b>2013</b>							
<b>Transit Fleet</b>	Diesel	3,092.96	93.24%	35,310.79	93.01%	\$ 850,409.59	92.53%
	Ethanol	15.20	0.46%	183.09	0.48%	\$ 6,865.70	0.75%
	Gasoline	208.94	6.30%	2,471.86	6.51%	\$ 61,791.30	6.72%
<b>Transit Fleet Subtotals</b>		<b>3,317.11</b>	<b>55.30%</b>	<b>37,965.74</b>	<b>54.86%</b>	<b>\$ 919,066.59</b>	<b>51.87%</b>
<b>Vehicle Fleet</b>	Biodiesel	54.37	2.03%	624.02	2.00%	\$ 17,490.94	2.05%
	Diesel	1,116.18	41.63%	12,742.82	40.79%	\$ 332,327.85	38.97%
	Gasoline	1,510.50	56.34%	17,870.12	57.21%	\$ 502,901.30	58.98%
<b>Vehicle Fleet Subtotals</b>		<b>2,681.05</b>	<b>44.70%</b>	<b>31,236.97</b>	<b>45.14%</b>	<b>\$ 852,720.09</b>	<b>48.13%</b>
<b>Total</b>		<b>5,998.16</b>	<b>100%</b>	<b>69,202.71</b>	<b>100%</b>	<b>\$1,771,786.68</b>	<b>100%</b>
<b>2010-2013 Percent Change</b>		<b>-2.93%</b>	<b>-</b>	<b>-2.97%</b>	<b>-</b>	<b>20.82%</b>	<b>-</b>

Figure 31: Fuel Energy Consumption by Fuel Type 2010-2013 Comparison

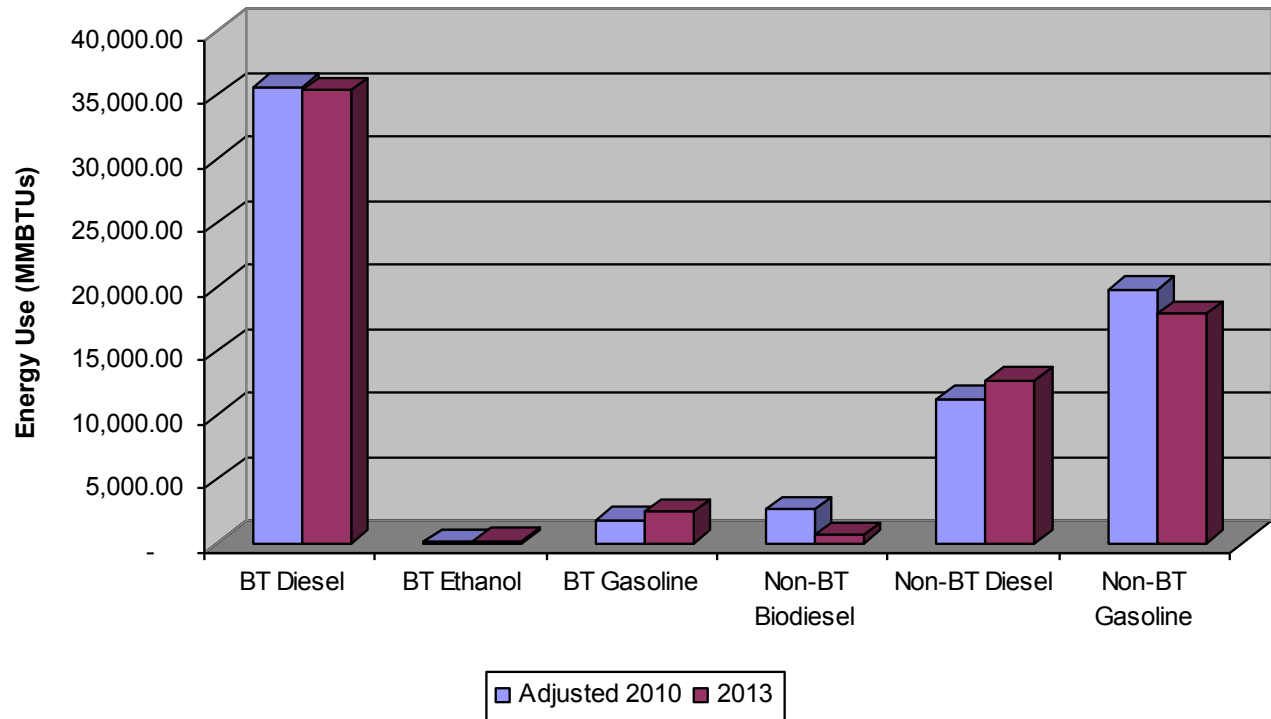


Figure 32: Vehicle Fuel Use by Fuel Type (2013)

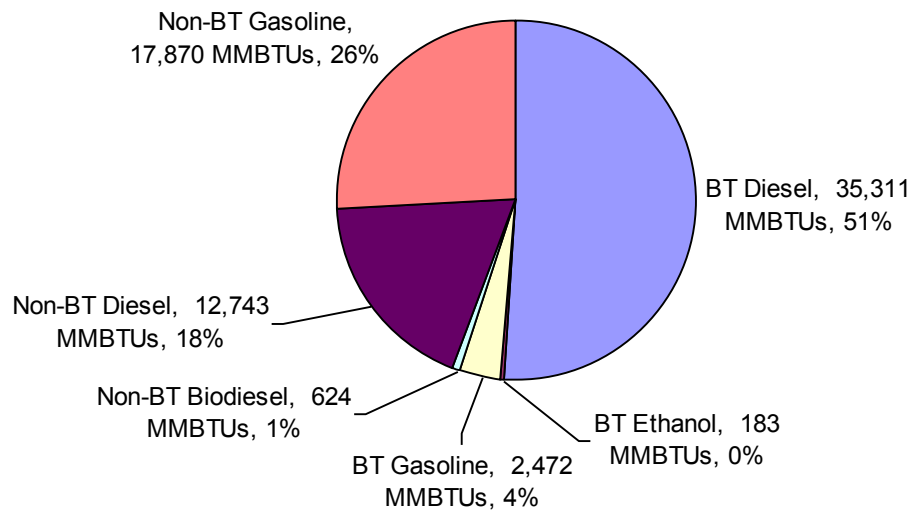


Figure 33: Fuel Expenditures by Fuel Type 2010-2013 Comparison

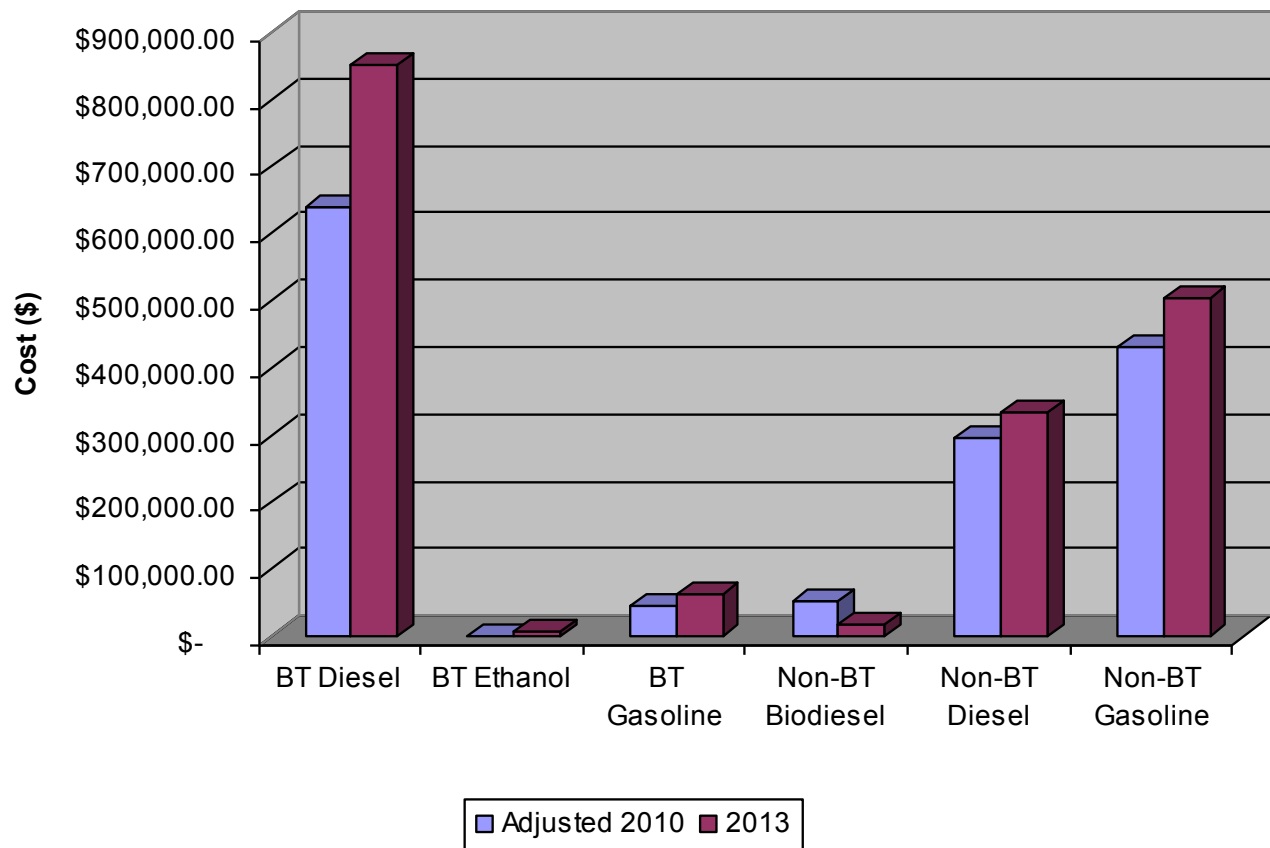
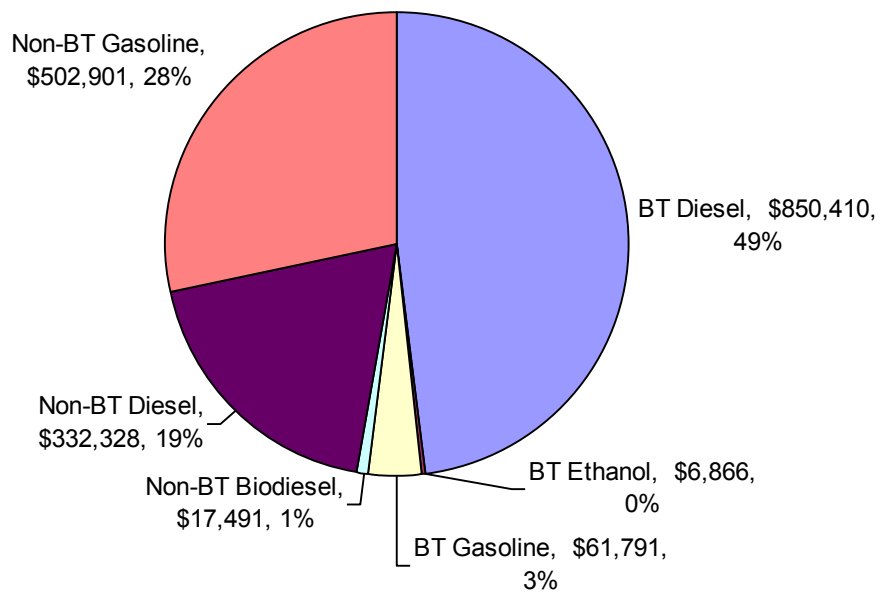
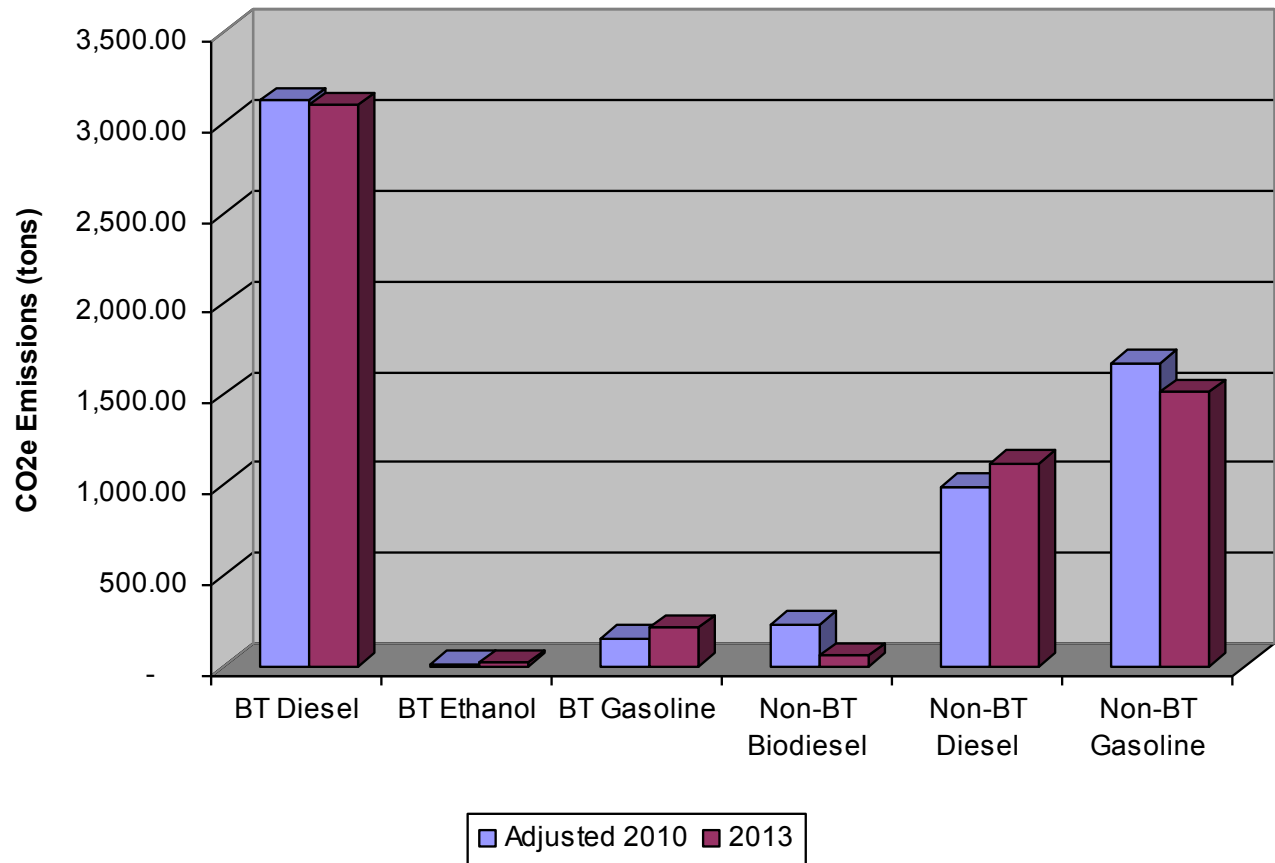


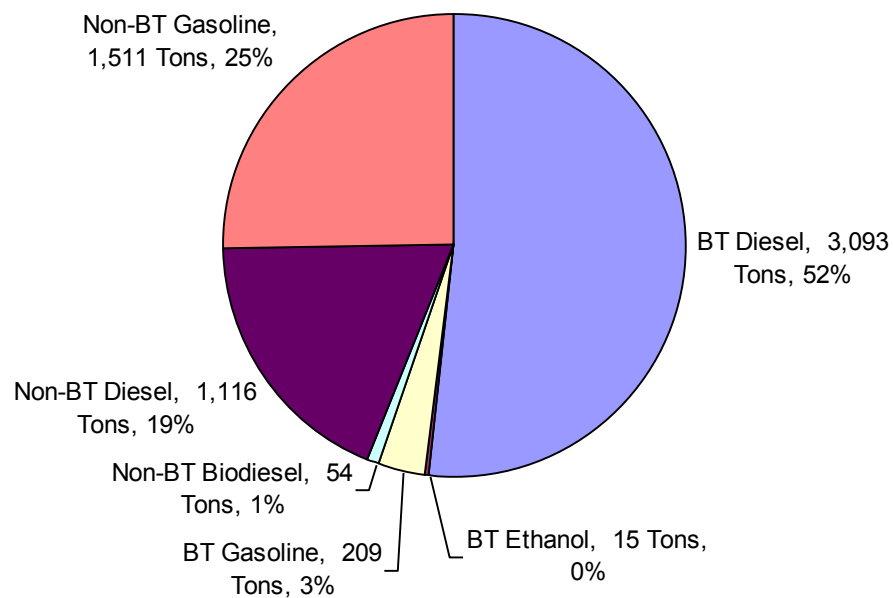
Figure 34: Cost of Vehicle Fuel by Fuel Type (2013)



**Figure 35: CO<sub>2</sub>e emissions by Fuel Type 2010-2013 Comparison**

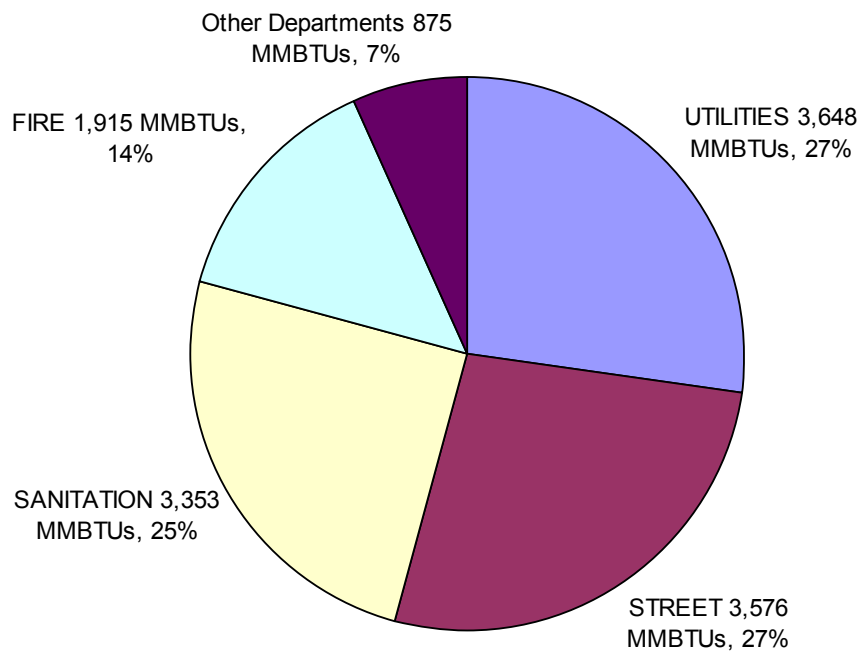


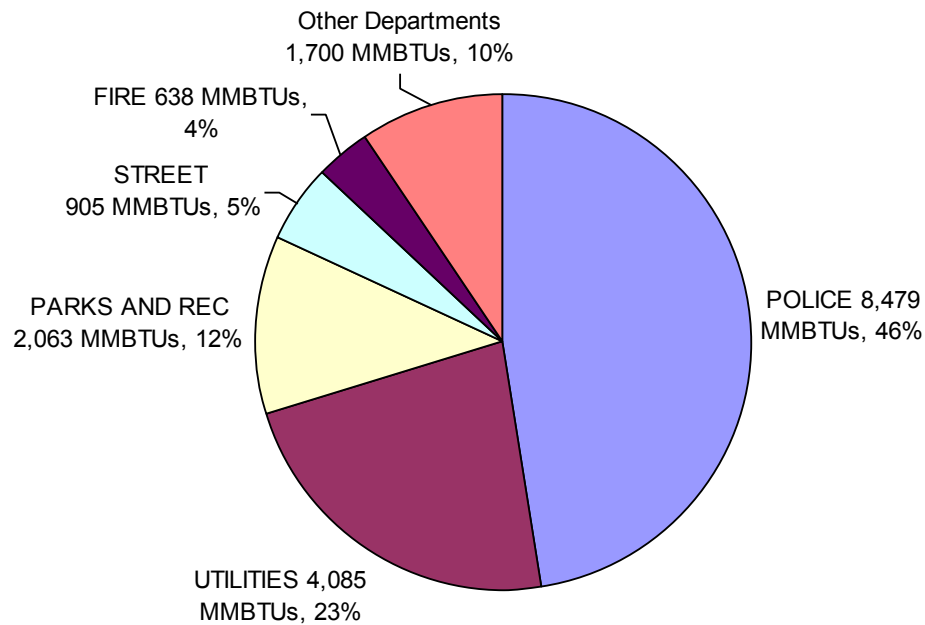
**Figure 36: CO<sub>2</sub>e Emissions associated with Vehicle Fuel (2013)**



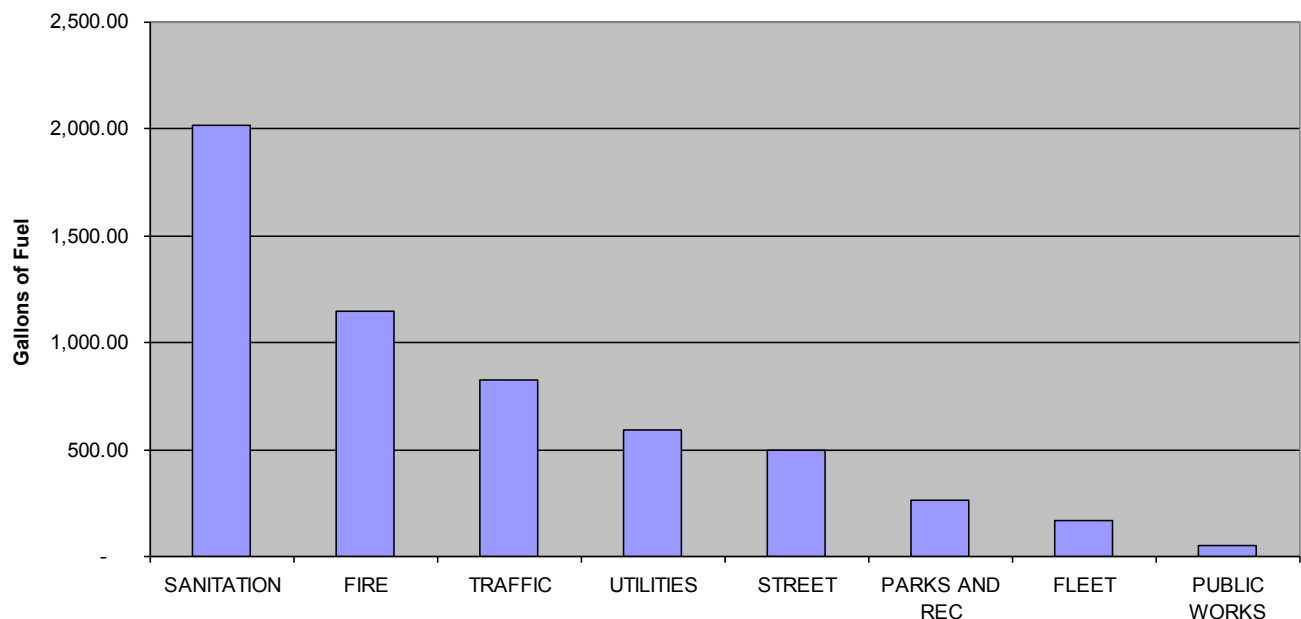
As Figures 31-36 illustrate, BT is the single largest consumer of fuel in City government operations and a majority of vehicle-fuel-related energy consumption (roughly 38,000 MMBTUs or 55%), associated costs (approximately \$919,000, 52%) and CO<sub>2</sub>e emissions (about 3,300 tons, or 55%) originate from BT. To enable a closer look at the division of energy consumption by fuel type and by City non-transit departments, BT consumption has been removed from the following figures.

**Figure 37: Diesel Consumption by Non-Transit City Department (2013)**

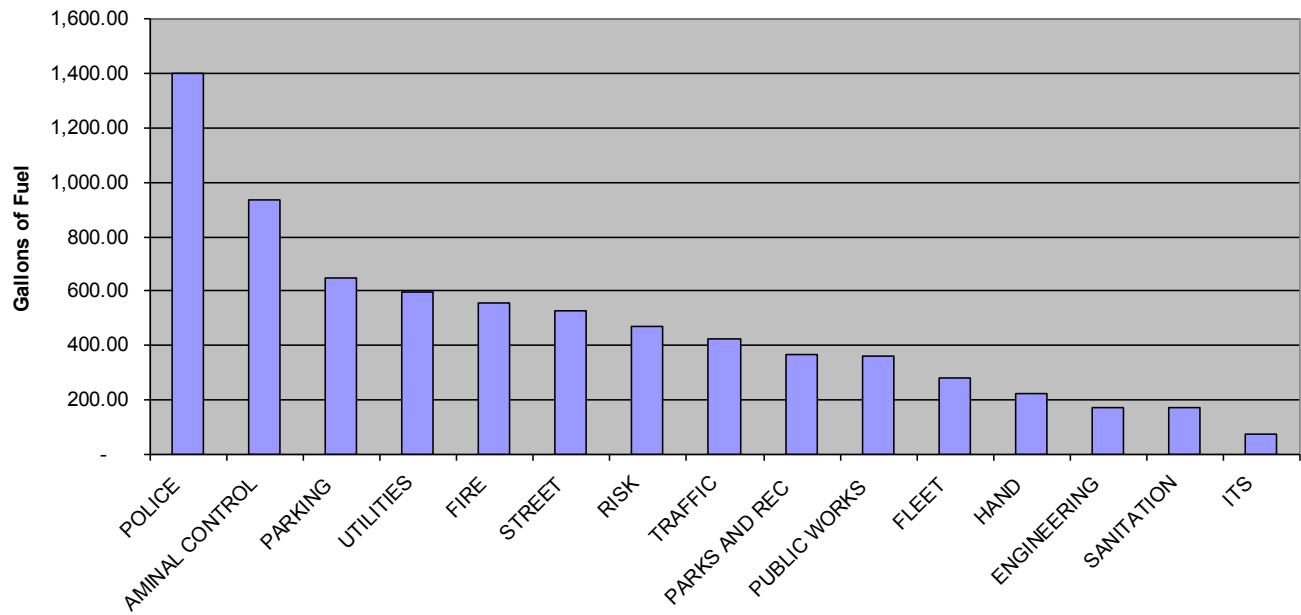


**Figure 38: Unleaded Gasoline Consumption by Non-Transit City Department (2013)**

As figure 37 above illustrates, City non-transit diesel consumption is roughly equal among the Utilities, Sanitation, and Streets departments. Figure 38, however, illustrates that City gasoline consumption is dominated by the police department, with Utilities using the second highest amount. The final two figures below illustrate the average amount of fuel used per vehicle per City government department.

**Figure 39: Average Gallons of Diesel Consumed per Vehicle per Department (2013)**



**Figure 40: Average Gallons of Gasoline Consumed per Vehicle per Department (2013)**

# 2010 Short-Term Recommendations Progress

From the analysis conducted in the 2010 Inventory, four distinct short-term recommendations were identified. These recommendations were to:

1. Ensure that all departments are tracking not just cost but quantities of energy and water consumption;
2. Continue gathering usage data for specific buildings to help identify candidates for targeted improvements and upgrade investments;
3. Explore fuel-saving technology, efficient driving techniques, and vehicle replacements for high-consumption departments and vehicle types; and
4. Make energy efficiency a priority at Utilities.

This report, through the process of collecting the necessary data and analyzing that data, finds evidence that progress has been made on each of the short-term recommendations prescribed in 2010.

Since the 2010 Inventory, utility data is collected by three departments for all City operations: CBU, Parks and Recreation and Public Works. These three departments presently track the quantity of utilities consumed (x thousand gallons of water or y kWh of electricity) as well as the cost associated with that consumption. The City's Department of Economic & Sustainable Development (ESD) has worked to identify high-use facilities and address these through efficiency upgrades and conservation policies such as the winterization policy. Passed in 2012, this policy addresses high utility consumption that occurred in facilities that were closed for the winter season. ESD has also conducted research on various heavy-duty vehicle conversion options such as diesel-electric and hydraulic launch assist hybrids. Additionally, ESD has promoted the City's bike fleet to all employees for use on short trips around the City and to other City facilities. Finally, while CBU remains the dominant energy consumer in City Government Operations, improvements have been made. Most notably CBU's water delivery service made substantial reductions in energy consumption from 2010-2013 and is no longer the highest user of energy in City operations.

Collectively, these efforts and other like them have contributed to the City achieving the observed energy reductions. These improvements and successes will be used to develop new recommendations and guide future progress towards greater energy awareness, conservation and efficiency in City Government operations.

# Conclusions and Recommendations

Based on the findings outlined herein, it becomes clear that the City of Bloomington's government have achieved modest reductions in total energy consumption and CO<sub>2</sub>e emissions while avoiding additional costs from rising energy prices. Some sectors of City government operations have seen increases, though these increases have been due to increases in services offered by the City Government. As the City moves forward from this analysis, it has created a platform by which further improvements may be achieved through targeted efforts and overall process improvements. With this in mind, the following short-term recommendations are prescribed before the next inventory is completed.

1. **Pursue Guaranteed Energy Savings Contracts.** This state-authorized approach to performance contracts allows the City to invest in energy efficiency and renewable energy without fronting capital costs.
2. **Increase the accuracy of departmental utility data tracking and ensure ease of access.** Currently City utility accounts experience a wide range of meter reading dates and each department reports their utility data in different ways. Creating a uniform format or system for all departments to follow will simplify future analysis and improve the quality of such analysis.
3. **Concentrate energy conservation and efficiency efforts on energy sources that represent high costs or emissions to City operations.** Through a targeted focus on high-use facilities and high cost (and emissions) energy sources the City will be able to achieve greater reductions in the future.
4. **Create and maintain a comprehensive list of projects and improvements from all departments to avoid business-as-usual purchasing.** By creating a list of identified projects as well as equipment replacement guidelines the City can plan for projects with direct benefits to energy consumption as well as avoid replacement of aging equipment with a similarly inefficient piece of equipment.
5. **Foster a portfolio-based approach to energy conservation and efficiency.** Including both rapid and slow payback projects in all major energy improvement projects will ensure that the collective payback period is reasonable and justifiable. This ensures that the City can implement projects that have a longer pay-back period but are similarly worthwhile due to other benefits which may be harder to quantify.

As the City of Bloomington strives to build on these improvements and increase the environmental health and vibrancy of the community it serves, the City should maintain a focus on holistic sustainability. As such, the City should foster a culture that considers the sustainability of all City operations. Not just energy efficiency, renewable energy generation and climate change impact adaptation and mitigation planning, but also progressive design standards, and employee and community health. Through these actions and others, the City of Bloomington can not only reduce its energy usage and save City revenue. It can also improve the community's economic vitality and quality of life.